REPORT RESUMES

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ROLE OF EVALUATION IN CREATIVE THINKING.
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THE OBJECTIVES WERE TO DETERMINE THE EFFECT OF TEACHERS' ATTITUDES TOWARD CREATIVE THINKING ON THEIR EVALUATIVE BEHAVIOR IN THE CLASSROOM AND ON THE CREATIVE THINKING OF THEIR PUPILS. FURTHER OBJECTIVES WERE TO ASCERTAIN THE EFFECTS OF VARIOUS KINDS OF EVALUATIVE COMMENTS ON THE IDEAS OFFERED BY STUDENTS, AND TO DETERMINE WHETHER OR NOT SUGGESTIONS FOR IMPROVEMENTS OR CRITICISM OF DEFECTS SHOULD BE STRESSED IN TRAINING INDIVIDUALS TO EVALUATE THEIR OWN CREATIVE PRODUCTS. TWO GROUPS OF TEACHERS WERE THE SAMPLE--(1) THE EXPERIMENTAL GROUP WAS GIVEN A SERIES OF INSERVICE TRAINING SESSIONS AND A MANUAL CONCERNING THE EVALUATION OF CREATIVE THINKING IN THE CLASSROOM, (2) THE CONTROL GROUP WAS NOT TRAINED. PUPILS IN BOTH GROUPS WERE ADMINISTERED TESTS OF CREATIVITY AT THE BEGINNING AND END OF THE EXPERIMENT. QUESTIONNAIRES WERE ADMINISTERED TO TEACHERS AND PUPILS TO PROBE CREATIVE ATTITUDES, CRITICAL ATTITUDES, AND PERCEPTIONS OF EACH TEACHER'S EVALUATION BEHAVIOR IN RELATION TO CREATIVE THINKING AND ACTIVITIES OF PUPILS. GRADES 1-6 WERE GIVEN TASKS REQUIRING CREATIVITY AND INVENTIVENESS. COMMENTS ON DEFECTS, IMPROVEMENT NEED, AND CONSTRUCTIVE POSSIBILITIES WERE COLLECTED, ANALYZED, AND COMPARED. RESULTS SHOWED THAT--(1) THE INSERVICE EDUCATION EXPERIMENT WAS INCONCLUSIVE THOUGH SUCCESSFUL IN MANY WAYS, (2) TEACHERS DO INFLUENCE THE CREATIVE THINKING OF STUDENTS, AND (3) THE STUDENTS' EVALUATION OF THEIR OWN CREATIVE PRODUCTS IS OF VALUE. (GC)

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ROLE OF EVALUATION IN CREATIVE THINKING

Cooperative Research Project No. 725

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BUREAU OF EDUCATIONAL RESEARCH
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1964

The research reported herein was performed pursuant to a contract with the United States Office of Education, Department of Health, Education, and Welfare.

This report is dedicated in memory of the late Walter Wellman Cook, Dean of the College of Education, University of Minnesota. He encouraged the conduct of these studies even when several agencies and foundations refused to support them.

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E. Paul Torrance
Principal Investigator
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Chapter 1

THE NEED FOR REWARDING CREATIVE THINKING

"What is honored in a country will be cultivated there."

-- Plato

Plato was neither the first nor last investigator to discover that people tend to learn and develop along whatever lines they consider rewarding. The truth of Plato's assertion has been validated by dozens of experiments employing modern methods of research. Thus, if we want to develop the creative thinking potential of today's school children, it is reasonably certain that we must somehow learn to reward creative thinking. The problem is not nearly as simple, however, as it would at first appear. While there is considerable agreement that the educational environment should place a high value upon creative behavior, little is known about the principles whereby such an environment can be created in classrooms, laboratories, and conference rooms.

It has been the underlying purpose of the series of studies described in this volume to search out, formulate, develop, and test principles for (a) creating an environment which places a high value on creativity; (b) guiding the evaluative behavior of teachers, counselors, and administrators; and (c) helping children develop evaluative behavior conducive of creative thinking. Some believe that a school's grading system, the awarding of honors and scholarships, and the school's entire status system should give recognition to creative achievement. Others believe that such practices would disrupt creative processes and that the rewards must come from the enjoyment of the creative process itself. Concerning evaluative behavior, some authorities maintain that all external evaluation must be absent in the environment which nurtures successfully creative behavior. Others insist that all negative evaluation be made taboo and still others emphasize the importance of using positive and negative evaluation in order to stimulate and develop creative thinking. Concerning the evaluative behavior of the creative personality, some advocate a "free-wheeling," abandoned, uncritical attitude. Others stress the importance of sensitivity to deficiencies and still others consider the key to be an attitude of constructive criticism. From such diverse and virtually untested ideas competing with one another, the present investigator formulated the experimental approaches which will be reported in this volume in an attempt to gain information which might contribute in some small way to the resolution of these issues.

Since the term "creative thinking" means such different things to different people and since the goals for developing the creative thinking abilities are so frequently forgotten or misunderstood, I shall attempt in this chapter to explain what creative thinking meant to those who conducted the studies presented in this report and what we regard as the goals for developing creative talent.

The diversity of ideas about creative thinking to which I have referred is illustrated by the results of a survey involving 212 teachers in 65 elementary schools (Wolf, 1961). In response to the question, "What does the concept of 'creativity' mean to you?" almost a half of the teachers who responded conceived of creativity as a personal characteristic. About 25 per cent related the concept to a product or end, while approximately 20 per cent identified the concept as a process.

When asked, "What creative learning experiences would be representative of your particular classroom situation?" two-thirds of the elementary teachers listed experiences which pervade the entire elementary curriculum. Twenty per cent described experiences unique to the fine and applied arts areas and about 12 per cent mentioned experiences designed to supplement instruction within the skills and content areas of the curriculum.

The third question Wolf asked the elementary teachers was, "Why were these creative learning experiences undertaken in your classroom?" Two-thirds of them stated that they employed these experiences to expedite specific learning and/or instruction in the classroom, whereas slightly less than 25 per cent gave the provision of enjoyment and satisfaction as the purpose of the creative activities they used.

A fourth question asked, "What outcomes of these creative learning experiences do you consider desirable?" A third of the teachers named improved personal and/or social adjustment of the child as a desirable outcome. Almost a third mentioned improved instruction which facilitates learning. Twenty per cent valued new vistas for self-expression and worthy use of leisure time and about 14 per cent saw personal satisfaction and a feeling of accomplishment as desired outcomes.

Let us examine now some of the research evidence and authoritative opinions concerning these questions, as a background for understanding and interpreting the studies which are described in this volume.

What is Meant By Creativity?

Diverse Definitions

Quite justifiably creativity may be defined in many ways. As occurred in Wolf's (1961) survey, it is usually defined as a kind of person, a product, or a process. It may also be defined in terms of an environmental condition. Rhodes (1961) has referred to these four kinds of definitions as the "Four P's of Creativity" (Person, Process, Press, and Products). In attempting to combine these four approaches, Rhodes has defined the word creativity as "a noun naming the phenomenon in which a person communicates a new concept (which is the product)." He explains that mental activity (or mental process) is implicit in the definition and that no one could conceive of a person living or operating in a vacuum, so the term "press" is also implicit. He admits that the definition begs the question as to how new the concept must be and to whom it must be new.

Newness

The production of something new is included in almost all of the definitions given by those who have investigated creative behavior. Thurstone (1952) argued that "whether society considers the idea to be novel has nothing to do with the case." He maintained that an act is creative if the thinker reaches the solution in a sudden closure which necessarily implies some novelty for him. To Thurstone, the idea might be artistic, mechanical, or theoretical. It might be administrative if it solves an organizational problem. It might be a new football play, a clever chess move, or a new slogan. Stewart (1950) shares Thurstone's view on this issue, maintaining that "productive thinking refers to an act of the individual's mind apart from the fact that the result of that mental action may or may not have been achieved by someone else at an earlier time." He points out that by this definition, productive thinking may take place in the mind of the humblest workman as well as in the most distinguished statesman, artist or scientist.

Stein (1953), contrary to Thurstone and Stewart, insists that creativity must be defined in terms of the culture in which it appears. To him, "novelty" or "newness" means that the creative product did not exist previously in the same form. It may involve a reintegration of existing materials or knowledge, but it must contain new elements. Stein also requires that to be creative the novel work must be "accepted as tenable or useful or satisfying by a group in time." He hypothesized that studies of the creative person may reveal a sensitivity to the gaps that exist in his own culture and that his creativity may be manifest in calling attention to these gaps. In addition to sensitivity, Stein calls attention to tolerance of ambiguity and ability to maintain direction as hypotheses are tested and refined as characteristics of the creative person.

Creativity Contrasted with Conformity

A number of investigators (Crutchfield, 1962; Wilson, 1956) have defined creativity by contrasting it with conformity. In general, creativity has been seen as contributing original ideas, different points of view, and new ways of looking at problems. Conformity has been seen as doing what is expected and not disturbing or causing trouble for others. Although Crutchfield (1962) does not attempt to equate independent thinking (which he contrasts with conformity) with creative thinking, he sees independent thinking as necessary for creative thinking. In his experiments, Crutchfield found that the independent thinkers were able to cope effectively under stress, relatively unsusceptible to generalized anxiety, relatively free of feelings of inferiority and inadequacy, open and free in emotional processes, ascendant in relations with others, persuasive, able to mobilize resources easily and effectively, active and vigorous, natural and free from pretense, expressive, and able to seek and enjoy aesthetic and sensuous impressions.

True, Generalizable, and Surprising

Hans Selye (1962) in his definition requires that basic discoveries or creative contributions possess to a high degree and simultaneously three qualities: "They are true not merely as facts but also in the way they are interpreted, they are generalizable, and they are surprising in the light of what was known at the time of the discovery" (Selye, 1962, p. 402). H. H. Anderson (1959) also emphasizes the search for the truth and living truthfully as a part of his definition of creativity. He is especially insistent that the creative environment must provide freedom for each person to respond truthfully with his whole person as he sees and understands the truth.

Other Definitions

Eugene Hammer (1961) insists that the creative product must be new, fresh and original and that it must be worthwhile, important, or highly valued. To Ferren (1953) the creative product must represent a successful step into the unknown. Sir Frederick Bartlett (1958) employs the term "adventurous thinking" which he defines as "getting away from the main track, breaking out of the mold, being open to experience and permitting one thing to lead to another."

Creativity as a Process

A number of approaches have been suggested by those who have studied creative thinking as a mental process. Spearman (1930), for example, saw creative thinking basically as a process of seeing or creating relationships, with both conscious and subconscious processes operating. According to one of his principles, when two or more percepts or ideas are given, a person may perceive them to be in various ways related (near, after, the cause of, the result of, a part of, etc.). Another principle held that when any item and a relation to it are cognized, then the mind can generate in itself another item so related.

Welch (1946), Rossman (1931) and others have also emphasized the role of forming new relationships among known or old elements. Welch's various tests of creative thinking are based on the assumption that the ability to recombine ideas according to some specific pattern or plan is one essential element of any type of creative thinking. Rossman studied the activities of several hundred inventors and saw much of their activity as taking the known and old ideas and creating new and non-obvious patterns out of them. He insists, however, that the inventor must use sound judgment in selecting his problems, eliminating non-essentials, planning the method of attack and modifying his plans as he goes along.

Ribot (1906) and a number of others since him have emphasized the capacity of thinking by analogy as the essential, fundamental element of creative thinking. He maintains that the process of analogizing gives rise to the most unforeseen and novel combinations, but warns that it produces in equal measure absurd comparisons and very original inventions. Recognizing the non-rational aspects of creative thinking, a number of investigators have called attention to the exercise of discrimination and choice as a part of the creative process. Barchillon (1961), for example, says that the thinking processes involved in creation are of two kinds: *cogito*, to shake and throw things together, and *intelligo*, to choose and discriminate from many alternative possibilities and then synthesize and bind together elements in new and original ways. What he has in mind by *cogito* is apparently similar to what Kubie (1958) conceptualizes as taking place in the "preconscious system." The preconscious is apparently able to scan quickly experiences and memories, to condense, to join opposites, and find relationships at speeds impossible to obtain in the conscious system. The resulting intuitions, however, are not very precise and are subject to the primary process type of thinking.

Mental Abilities Approach

Guilford (1956, 1959b, 1960a) has conceptualized creativity in terms of the mental abilities involved in creative achievement. In his well-known structure of the intellect, he sees creative thinking as clearly involving what he categorizes as divergent production. He defines divergent production as the generation of information from given information, where the emphasis is upon variety of output from the same source (innovation, originality, unusual synthesis or perspective). Included in the divergent thinking category are the factors of fluency, flexibility, originality, and elaboration. He has concluded, however, that creative thinking cannot be equated with divergent thinking. He believes that the redefinition abilities and sensitivity to problems are also important in creative thinking. The redefinition abilities involve transformations of thought, reinterpretations, and freedom from functional fixedness in deriving unique solutions. Sensitivity to problems seems to be essential in getting the creative thinking process in motion.

Levels of Creativity

I. A. Taylor (1959) has sought to reconcile some of the apparent differences in opinion concerning creativity by suggesting that we think of creativity in terms of various levels. He suggests the following five levels:

Level 1: Expressive creativity: independent expression where skills, originality, and the quality of the product are unimportant, as in the spontaneous drawings of children.

Level 2: Productive creativity: artistic or scientific products where there is a tendency to restrict and control free play and develop techniques for producing finished products.

Level 3: Inventive creativity: inventors, explorers, and discoverers, where ingenuity is displayed with materials, methods, and techniques.

Level 4: Innovative creativity: improvement through modification is possible, involving conceptualizing skills.

Level 5: Emergenative creativity: an entirely new principle or assumption around which new schools flourish.

Taylor points out that many people have this fifth level in mind when they talk about creativity. Since this fifth level of creative behavior is so rare, the lower levels have usually been involved in most of the investigations concerning creative behavior. Taylor also objects to the frequent confusion of creativity with prevalent interpretations of traditional logic, scientific method, and intelligence. He maintains that fantasy associations and relaxation for unconscious play are so essential for creative thought that creativity cannot be subjected to the same interpretations as logic and scientific method.

U.S. Patent Office Criteria

Inventive creativity, Taylor's third level, has perhaps been subjected to more systematic definition and specification of criteria than any of the other levels. The rights of inventors to their discoveries are specified by Article 1, Section 8, of the Constitution of the United States. Thus, we have patent laws passed by Congress and implemented by the U.S. Patent Office which have made an effort to spell out the criteria by which the inventive level of a patent application can be assessed (Cochran, 1955). The Patent Office grants patents only for invention. By this, it is meant that "it is not enough that a thing shall be new, in the sense that in the shape or form in which it is produced, it shall not have been before known, and that it shall be useful, but it must, under the constitution and the statute, amount to an invention or discovery." In general, one is considered to have invented something if he has originated a thing of merit which others skilled in the art or science to which it relates would not have thought of or would not have known how to achieve if they had thought of it. He is entitled to a patent only if he discloses an invention which is not already within the knowledge of the public. The following are some criteria which have been decided upon as indicating lack of novelty or lack of invention:

1. Changes requiring only mechanical skill.
2. Change in size.
3. Duplication of parts of a device.
4. Omission of an element of a device or step of a method.
5. Reversal of parts.
6. Change of material.
7. Use of old process or method to a different but analogous object or material.
8. Making a device adjustable.
9. Change in an element of an old combination.
10. Aggregation of elements.

Exceptions occur in almost all of these general negative tests, if the device overcomes prior failure, overcomes some special difficulty, offers something remarkable or surprising, overcomes prior skepticism about possible success, or meets an unfulfilled need. It should be apparent that most of these criteria can be adapted to apply to a variety of creative products. In fact, these criteria have been adapted for use in evaluating some of the products which were involved in some of the experiments described in this report.

Creative Persons

Sprecher (1959) investigated the meaning of creativity in a rather interesting way by asking engineers in a large industrial firm to give reasons why the men they had ranked highest in creativity differed from those ranked lowest. He obtained the following rank order of the first ten variables in reasons why men are regarded as creative:

1. Is independent of others versus needs guidance in problem solving.
2. Produces novel and unconventional solutions versus routine ones.
3. Produces one or more solutions versus no solutions.
4. Prefers new and difficult problems versus prefers routine problems.
5. Produces practical and valuable solutions versus impractical solutions.
6. Analyzes situations versus doesn't or can't analyze.
7. Shows energy and alertness versus lacks energy.
8. Produces many solutions or ideas versus few solutions.
9. Has a high degree of technical knowledge and academic achievement versus a low degree.
10. Organizes and plans ahead versus is unorganized and overlooks detail.

Using a far more elaborate approach, MacKinnon (1962) and his associates identified highly creative people in such diverse fields as architecture, writing, mathematics, and industrial research scientists and engineers. They then did elaborate personality studies of these highly creative people contrasting them with their less creative peers.

MacKinnon has characterized the highly creative architect as follows: dominant, possessed of those qualities and attributes which underlie and lead to the achievement of social status, poise and spontaneity in personal and social interaction, not especially sociable or participative, outspoken and sharp-witted, aggressive and self-centered, persuasive and verbally fluent, self-confident and self-assured, and relatively uninhibited in expressing worries and complaints. He is relatively free from conventional restraints and inhibitions, not preoccupied with the impressions which he makes on others, and able to recognize and admit unusual and unconventional self-views. He is highly motivated to achieve in situations where independence in thought and action are required and less highly motivated than his peers to achieve in situations requiring conforming behavior. He is also more flexible psychologically and cognitively and more feminine in his interests than architects in general. He is highly perceptive and open to richness and complexity of experience and has a preference for perceptual complexity. He has a greater tolerance of complexity and disorder and has a stronger preference for perceiving than for judging. He prefers intuitive-perception over sense-perception and is more likely to be introverted than extroverted. He cares little about being included in a group and in general prefers to be left alone, yet tends to act in a dominant manner in social interaction. His dominant values, as measured by the Allport-Vernon-Lindzey Study of Values, are theoretical and aesthetic.

Choice of a Definition for Use in Research

An analysis of the diverse ways of defining creativity which have been cited thus far will reveal that these definitions do not divide themselves neatly into the categories of "person, process, product, and press." It is true that some definitions emphasize one or the other of these categories but almost all somehow spill over into one or more other categories. Thus, it seems inevitable to me that a thorough understanding of creativity must involve the study of all four aspects of creativity (person, process, product, and press). It is obvious that an investigator must at any one time focus on one aspect and then on another, always being alert to the other three aspects of creativity. As the focus of thinking, I have chosen a process definition, but in the experiments described in this volume the focus of investigation has been on the "press" or environment. If we define creativity as a process, we can then ask what kind of person must one be in order to engage most successfully in the process, what kinds of environment does he need in order to function most successfully, and what kinds of products result from the process.

I have tried to describe creative thinking as taking place in the process of sensing difficulties, problems, gaps in information, missing elements; making guesses or formulating hypotheses about these deficiencies; testing these guesses and possibly revising and retesting them; and finally in communicating the results. I like this definition because it describes such a natural process. Strong human needs appear to be at the basis of each of its stages. If we sense any incompleteness, something missing or out of place, tension is aroused. We are uncomfortable and want to do something to relieve the tension. As a result, we begin investigating, asking questions, manipulating things, making guesses, and the like. Until the guesses or hypotheses have been tested, modified, and retested, we are still uncomfortable. Then even when this has been accomplished, the tension is usually unrelieved until we tell somebody what we have discovered.

To illustrate this process, I sometimes give a class or an audience as it assembles one of the tests we have developed for assessing the creative thinking abilities, such as the Incomplete Figures Test. After a while, I check with them to find out what has happened. Most of them will admit that the incompleteness of the figures had made them uncomfortable. Usually some of them have gone ahead and completed the figures in some way either by actually drawing lines or imaginatively by thinking of ways for completing the figure. I then ask them to go ahead and complete the figures in some way that will be satisfying to them. There is usually almost no reluctance even in the most staid audience. There is an obvious atmosphere of relief, increased liveliness, even smiles and laughter. There is also a spontaneous interest in communicating the results and in seeing what each other has created.

If the thinking of the audience is bound to some specific curricular content, such as reading, art, science, or language arts, I try to show how the process operates with that specific curricular content. For example, let us take the problem of reading creatively. When anyone reads creatively, he must first of all become sensitive to the problems and possibilities involved in whatever he reads. He makes himself aware of the gaps in knowledge, the unsolved problems, the missing elements, things that are incomplete or out of focus. To resolve this tension, the creative reader sees new relationships, creates new combinations, synthesizes relatively unrelated elements into coherent wholes, redefines or transforms certain pieces of information to discover new uses, and builds onto what is known. In this search, the creative reader produces a variety of possibilities, uses a great variety of approaches, looks at the available information in a variety of ways, breaks away from commonplace solutions into bold new ways, and develops his idea by filling in the details and making the idea attractive or exciting to others.

If at this point I want to communicate something about the qualities of the creative product, I ask my audience to discuss the qualities of the products which they have just produced. In addition to the divergent thinking qualities (fluency or number of ideas, flexibility or shifts in approaches, originality or statistical infrequency of the idea, and elaboration or the amount of detail or completeness manifested), we talk about such qualities as penetration or the mental leap from the stimulus to the response, the degree to which the idea communicates, and the like.

In order to communicate something of the importance of the press or environment, I have on several occasions conducted a tape-recorded exercise created by Cunnington and me (1963) and called "Sounds and Images." It has built into it several "presses" which are applications of research findings which have been found to facilitate originality of thinking. The tape-recording consists of four different sound effects, ranging from an easily recognizable sound one, having few "missing elements," to a strange one made up of six relatively unrelated sounds. This set of four sound effects is presented with a slight pause between each with instructions to write down a word picture of the image generated in the listener by the sound effect. The sound effects are then repeated with instructions to let the imagination roam more widely and get away from the most obvious images. After this, the sound effects are repeated a third time with instructions to let the imagination swing free. An attempt is made to free the audience of threats of evaluation and to encourage them to "have fun." An attempt is also made to break the "set" between each of the repetitions of the sound effects. Finally, the audience is asked to select their favorite image or word picture and translate it into a picture. I then ask the audience to describe what they had experienced, trying to identify what features of the environment (the taped exercise, the situation, etc.) facilitated or inhibited their efforts to think of original images. They quickly identify such things as the warm-up process, going from the easy to the difficult, the legitimacy of thinking divergently, freedom from the threat of evaluation, and the like.

If I want to communicate something of the importance of the person, I identify myself the presses or built-in environmental features and then ask the audience to identify those forces in themselves which facilitated or inhibited them in making use of these built-in features. This usually results in a lengthy list of personality factors, (most of which have been found to be related to creative behavior) and hopefully in an increased awareness on the part of the audience of their own creative potential and an increased understanding of the forces in their own personalities which influence their creative functioning and those of their associates.

Why is Creative Thinking Important?

Creativity, a Powerful Force

Among educators, there are those who look upon creative thinking in the school as threatening and dangerous, while others see it as a powerful force for lifting man to higher levels of intellectual functioning, human dignity, and achievement. To some extent both groups are justified in their attitudes. Creative thinking is indeed a powerful force. It has given us the alphabet, printing, radio, television, computers and space craft. It has given us our great art, architecture, music, and literature. It has given us our great advances in scientific discovery and medicine. It has also given us war, plunder, crime, and the smashed atom.

Creativity and Educational Goals

As we formulated plans for the project of which the experiments described in this report are a part, it was our dream that by achieving a better understanding of the human mind and the conditions which facilitate its full functioning we might provide some of the information needed to fashion a more humane kind of education which will give every child a better chance than he now has to achieve his potentialities. In the first public report of this research, I expressed the belief that it is tremendously important to society that creative talent be identified, developed, and used, that the future of our civilization depends upon the quality of the creative thinking of the next generation. I tried to show why we need to broaden our concept of "giftedness" from that of the "child with a high IQ" to include also the highly creative child, as well as other types of giftedness. I emphasized the importance of giving greater consideration to the fostering of original work, making this function as important as teaching information. I tried to express my concern that all areas of our society -- family, school, industry, government -- learn how to help its most creative members find places of usefulness instead of isolating, humiliating, and ridiculing them.

As our research evidence continued to accumulate (Torrance, 1962a), it became clear that creative thinking is important in mental health, educational achievement, vocational success, and many other important areas in life. As we studied creative behavior among both children and adults it became increasingly clear to me that perhaps nothing could contribute more to the general welfare of our nation and the satisfactions and mental health of its people than a general raising of the level of creative behavior. There is little doubt but that the prolonged and severe stifling of creative thinking cuts at the very roots of satisfaction in living. This must inevitably create overwhelming tension and breakdown.

Of course, there are those who are quick to point out that creative thinking leads only to trouble in the classroom. They point out that children are very imaginative and inventive in their lying, that they cheat and steal in very ingenious ways, and that they disturb classroom organization and procedures with their unusual ideas. They insist that all of these are signs of a mentally unhealthy person. Almost always, if they are honest, they will find that these socially disapproved manifestations of creative thinking ability are linked with a lack of guidance or with coercive and overly punitive discipline. This does not mean that lying, cheating, and other socially desirable behavior must be permitted to flourish. We do need to recognize that these undesirable behaviors may indicate valued potentialities, which, if properly guided and developed, may lead to socially valued achievements.

Creativity and Psychotherapy

A number of investigators have already called attention to the psychotherapeutic values of creative activities. Miriam Wilt (1959), for example, maintains that there is therapeutic value in permitting a child to tell his own story in his own way. She declares, "It may be a chimney to carry away the smoke, an escape valve for the pent-up steam" (p. 2). Such creative activities, she believes, will provide children under stress a legitimate, socially acceptable way to reduce the pressure. Through the creative activities of the child, teachers can gain a better understanding of children and children can gain increased insights into their own behavior. Through these activities, the child reveals himself to his peers and they reveal themselves to him, helping to develop, in Sullivan's terms (1953) non-parataxic interpersonal relations which are conducive to mental health.

Kubie (1958) warns, however, that merely being creative is not enough to protect us from mental illness or to cure us. Nevertheless, he too insists that "under appropriately devised circumstances creative activities can be used as one ingredient in the therapeutic process" (p. 2). In fact, it might be argued that the goal in almost all of the major schools of psychotherapy is to aid individuals to become more creative so that they can cope more adequately with the stresses of their lives.

Creativity and Educational Achievement

Early in our research (Torrance, 1959a, 1962a), it became clear that the creative thinking abilities, at least as we attempted to assess them, are important in the acquisition of even the traditionally measured kinds of achievement. This was especially true when the school program was such that it permitted children to achieve some of their learnings in creative ways, by inquiring, experimenting, exploring, and imagining rather than just by authority. It was found (Torrance, 1962a, p. 61) that the creative thinking abilities tend to become even more important in educational achievement when we reward self-initiated learning, creative applications of knowledge, the development of original ideas, and skills in making decisions based on scientific evidence.

Creativity and Vocational Success

Very early in our studies of creative thinking, the evidence began to suggest that the creative thinking abilities are important in success even in some of the more routine kinds of occupations, such as selling in a department store (Wallace, 1961). It has always been recognized, of course, that creativity is the distinguishing characteristic of truly outstanding persons in almost every occupation, especially in scientific discovery, invention, art, and music. I was somewhat surprised to find that the creative thinking abilities, as we were measuring them, were important in success in a commonplace occupation such as department store selling. This was true not just in the more skilled areas such as draperies and women's ready-to-wear clothing but in the more routine departments such as notions, candy, and the like.

Social Importance of Creativity

We have tried never to lose sight of the social importance of creative thinking. This consideration deserves special consideration in a world of stepped-up cultural change, explosion of knowledge, population explosion, and the like. We must be warned continually that the world is changing so fast that past "truths" often mislead instead of help. No longer is it easy to apply past truths to the problems of the present and of the future. Today's world "calls for new approaches to experience, both in acquiring it and in using what we already have" (Stevens, 1963, p. 56). It is obviously impossible to prepare today's school children to cope with all of the demands they will encounter, for all of the changes they will experience. The occupations in which many of them will earn their livelihood do not even exist today. It is foolish to believe that we can impart to children all of the facts and skills they will need. One obvious solution is to give them the motivations, the basic foundation, and the skills for continuing to learn for the rest of their lives.

Toynbee (1962) points out that America has been made great by a series of creative minorities. He warns, however, that America has been neglecting its creative minority. He argues that it is not only the responsibility of the creative minority to play the role of prophet and insist upon being heard, but the people also have a responsible part to play. His greatest concern is that we not make the spiritual climate of our society so adverse that "the life will have been crushed out of the prophet's potential message before he has had a chance of delivering it."

Why Is It Important That Creative Thinking Be Rewarded?

While there are still many people who believe that it is unnecessary to reward creative talent, most reasonable people recognize the need for rewarding creative thinking, at least at a superficial level. Although it is true that there are some children with vigorous creative imaginations who maintain their creativity in spite of rejection, ridicule, and coercion, the early phases of our studies of creative thinking in children yielded many indications that this is a prodigiously wasteful philosophy. We saw many children who had given numerous evidences of a powerful creative talent one year, deliberately and obviously sacrificing and suppressing this talent the next year. As the evidence from longitudinal and cross-cultural developmental studies of the creative thinking abilities began to accumulate, it became clearer and clearer to me that creativity needs to be energized and guided almost from birth. If it is stifled early, apparently it will only become imitative if it survives at all. The vigorous creative imaginations which survive early stifling and opposition may become dangerous to society and to civilization, if they learn only to act vigorously without guidance.

We soon discovered that we were not alone in our observations and conclusions concerning the need for rewarding creative thinking. Barkan (1960) came to such a conclusion through intensive observations and analyses of children's behavior in elementary school art activities. He observed that children are attentive to the reactions of other people. If their inventions and ideas are viewed with interest, children are encouraged to create more ideas. If their efforts are unnoticed or rejected, children lose confidence in their ability to create. They depend upon the ideas of others. Pauline Pepinsky (1959) came to a somewhat similar conclusion as a result of intensive studies in three natural organizations, a college campus, a research organization, and a planned community. She points out the need for patrons or sponsors who can protect the creative person whose ideas are ignored or rejected until he can work them out and make them productive. She also identified some of the strategies of productive independence. Buhl (1961) in a study of creative engineers found that their families encouraged them to discuss ideas with parents and friends and permitted them to try out some of their original ideas and to pursue independent interests.

We need to examine the reasons why it is important to reward creative thinking because there is a growing feeling that many aspects of our educational and social system actively discourage and inhibit creative thinking. The panelists in one major industrial conference on creativity (Deutsch & Shea, Inc., 1959) expressed the opinion that education has become highly standardized and discourages uniqueness. They charged that colleges devote their main emphasis on amassing and remembering a great number of facts without giving students much sense of the ways in which these facts can be used to build upon. The pervasiveness of the problem in education and society is suggested by Rousseau's (1962) analysis of the ways in which giftedness are handled in Rhodesia and Nyasaland. He points out that alertness and questioning may irritate teachers and that in some African languages a "clever" child is one who is docile and conforms. He warned that the teacher's docile pet seldom turns out to be the industrial tycoon.

A number of American educators for some years have been advocating evaluative procedures which would give greater rewards for creative behavior. Oscar Handlin (1962) believes that current grading or evaluation systems encourage memory, accuracy, neatness, and cautiousness but rarely call upon students to use their ability independently or speculatively, to deal with situations in which the answers are not known but must be discovered. Because of the premiums placed upon teachers' grades, Handlin states that only the reckless will dare not to know the right answer as the grader expects them or allow questions to draw their thinking in unexpected directions. Many high school and college students have put down on examinations answers which they know to be incorrect, because they knew or thought that the grader did not know the correct answer.

Some rare institutions recognize the world's hostility to curiosity and other behaviors involved in creative thinking and seek to offset its effects. A notable attempt is to be found in Morgan's (1960) address, "What Every Yale Freshman Should Know." After discussing the need for curiosity and admitting that the world does not much like curiosity, Morgan wryly encouraged the Yale freshmen by saying, "Children whose curiosity survives parental discipline and manage to grow up before they blow up are invited to join the Yale faculty." As a member of Yale's faculty they can go on asking questions and trying to find the answers. Here the world's hostility to curiosity can be defied.

Harry and Bonaro Overstreet (1954) would see the rewarding of creative thinking as a counteractant to the forces which discourage self-initiated learning. They observe that at the stage in life when we insist that a child learn what we want him to learn, we discourage his learning what he wants to learn by our ill-placed humor, irritation, or evasiveness. At this stage some children give up trying to learn anything and begin to fail in school. Ojemann (1961), on the basis of his distinguished work in the field of mental health, believes that our difficulty in rewarding creative thinking arises from a lack of the basic orientation needed to appreciate individual differences. He believes that creativity and mental health will become compatible and mutually reinforcing when a person develops a basic causal orientation to his social environment.

One of the reasons why deliberate efforts to reward creative behavior may be necessary is that creativity is perceived as a threat, especially to those in authority. Toynbee (1962) identifies two inimical forces to creativity: (1) an incorrect view of the function of democracy, to neutralize outstanding ability, and (2) vested interests. Pepinsky (1959), in her study of productive independence in three natural situations, found that an organization or a group will tolerate and even reward "a few, but not too many" individuals who do not conform to the established standards. The number tolerated or rewarded apparently depends upon the extent to which the creative minority constitutes a disturbing challenge to entrenched beliefs, vested interests, "duly constituted" authority, and the accepted "way of life."

Barchillon (1961) sees the need for rewarding creative thinking in the tremendously strong need of the individual who creates to communicate to others and to validate the creative act. He maintains, "The creative act needs a public and admiration; it can't wait to be shared with others; it requires validation, and seeks this proof from other sources and other points of view" (p. 11). He points to certain societies and epochs in history which nurtured creative people to a remarkable degree (Athens, Florence, etc.).

Some educators would reward creative behavior because they see in such behavior a powerful motivation for learning. A number of contemporary learning theories stress the point that young children derive a powerful impetus to learning from their tendency to explore unknown situations, to seek challenges which make use of freshly won skills, and deliberately to find problems at the edge of their capacities (Rubin, 1963). It is believed by a considerable number of educational psychologists that these motivations can be kept alive throughout a person's lifetime and continue to serve an important role in learning. Some, like Ruth Strang (1959), believe that one of the solutions is to include in the examinations in all subjects problems that call for creative responses rather than mere feats of memory and reproduction of facts. Others believe that it is necessary for all educators from kindergarten through graduate school to be alert to new ideas and to encourage those who produce new ideas to make the most of their abilities. Obviously, however, there are some types of so-called creative thinking which should be regarded with alarm. This is the kind which is based on false premises, distorts the truth, and fails to test hypotheses.

Conclusion

In this chapter, an effort has been made to describe what is meant by creative thinking, why creative thinking is important, and why it is important that creative thinking be rewarded. It is against this background that we ask the reader to evaluate and to interpret the studies which will be described in the chapters to follow. In the next chapter, an effort will be made to sketch the structure within which these studies fit.

Chapter 2

STRATEGY FOR STUDYING THE ROLE OF EVALUATION IN CREATIVE THINKING

As we became immersed in data concerning the lives of eminent creative people and as we attempted to observe and study the creative behavior of children and graduate students, we soon saw that the role of evaluation is crucial in creative thinking. As we tossed around the facts and impressions we had gleaned from many sources, it seemed to us that there are three aspects of the role of evaluation that we must study: (1) the way in which the society or immediate environment values creative behavior, (2) the evaluative behavior of one's teachers, parents, and peers, and (3) a person's evaluation of his own creative behavior.

In deciding upon this strategy, we did not intend to deny the importance of genetic factors. In fact, we had been doing and have continued to do many of the things that the investigator committed to a genetic approach would do. We have conducted many studies of individual differences. It seems rather obvious that a person's creative thinking ability is going to be influenced by the fact that he inherits his sense organs, peripheral nervous system, and brains. It seems to us, however, that the influence of the way a person's environment treats his curiosity and creativity needs is so powerful that it may greatly diminish the influence of genetic factors. At least, it seemed justifiable to adopt an environmental emphasis for the present series of studies.

An emphasis upon environmental factors leads to studies in which an attempt is made to change creative behavior. Thus, in the studies reported in this volume we shall not be looking for enduring personality characteristics which characterize individuals. Instead, we shall be looking for environmental factors which affect creative performance within an individual, either negatively or positively.

In this chapter, I shall try to present some background ideas about each of the three aspects of evaluation already mentioned and to sketch the questions which the present studies attempt to answer.

The Environment Which Values Creative Behavior

The Unfriendly Environment

It is an almost obvious fact that creative behavior is not likely to flourish in an environment which is hostile or indifferent to creative achievement. Allen (1962) offers an interesting analogy from his boyhood experiences in facing the icy blast as he stepped out of the kitchen door of his Massachusetts home on a winter morning. He says that his reaction was to cover up a little more completely. Allen points out that an idea that meets an icy blast is likewise painful to the producer. He tends to cover up and to withhold excellent ideas as well as ideas that are different. A person soon learns that it is better not to express his most precious ideas in an unfriendly environment.

The slowness with which investigators have been willing to study creative behavior may be a reflection of the value that society has placed upon such behavior. Ribot called attention to the neglect of creative imagination as a subject of inquiry in 1906. At that time he maintained that the study of "creative or constructive imagination" had been almost entirely neglected. The best, most complete, and most recent treatises on psychology at that time either failed to mention creativity or devoted scarcely a page or two to the topic. He reported that a few articles and a few brief, scarce monographs made up the sum of the past 25 years' work on the subject. In 1950, Guilford as president of the American Psychological Association, called attention to education's neglect of creativity. He reported that up to 1950 only 0.2 per cent of the titles in the Psychological Abstracts were in any way concerned with creativity. Osborn in 1948 called attention to this neglect and has continued to do so through his more recent books (1957, 1963) and the activities of the Creative Education Foundation.

The unfriendliness of the environment to creative behavior has been perceived as manifested by a decrease in certain kinds of creative behaviors with increasing age. Art teachers commonly state that the art techniques of young children are more like those of professional artists than are those of older children. Some workers have also observed that the poetry, songs, and stories composed by young children are more creative than those of older children. Even the vocal behavior of young children is more like that of great vocal artists than is the vocal behavior of older children. As Mearns (1958) warns, however, if creative products are not received with appreciation and respect, these creative talents do not develop.

Many investigators have tried to show that by making whole areas of experience taboo, a culture inhibits creative potential (Murphy, 1958; Rogers, 1954). They do not have in mind a life lacking in discipline and order. They have in mind the need for openness to experience, a willingness to entertain and to test new ideas, to permit one thing to lead to another in thinking. Margaret Mead (1959) believes that we are too dependent for our original thinking on persons who have been accidentally isolated. Such persons, she maintains, are rarely able to function in a team and creative achievements in the future will become increasingly dependent upon team efforts. She insists that our present ways of rearing children prepare them for team work but not to do the individual work which makes a team worthwhile.

Contributors to the Unfriendly Environment

Many social institutions and practices have been singled out as contributors to an unfriendly environment for creative behavior. One of these is the institution of higher education and its admission and evaluation procedures. In 1960, Getzels charged that the usual criteria used in college admission (tests, recommendations and rank in class) are biased in favor of the student with "convergent" intellectual ability and social interests. His contention was that students with superior "divergent" intellectual ability may in the long run prove to be more creative and that such students deserve a place in college along with the superior convergent student. In 1961, Mednick made a similar charge, maintaining that many of our most eminent creative people would never have been admitted to college if selection techniques had reached the current state of technology at the time they had applied for admission.

He contended that by evolving a "race of grade getters we have bred some extremely desirable characteristics out of our college population."

At about this same time, the National Merit Scholarship Corporation (Holland and Kent, 1960) began recognizing that many of their scholarships might be going to the wrong persons. Later, this organization established a program for giving scholarships to two categories of students who would not otherwise have been awarded such financial aid: students with high creative promise and students who are truly outstanding in some one field but less outstanding in others. Follow-up studies of these awards will test the wisdom of this practice.

Another way in which the environment has failed to reward creative behavior has been in assuming that creativeness is the sole prerogative of certain professionals -- artists, musicians, scientists, etc. Maslow (1962) describes how his own views changed on this point as he began to study what he calls self-actualizing people. He describes one woman, uneducated, poor, a full-time housewife and mother, who did none of the conventionally creative things. As a cook, mother, wife and homemaker she was original, novel, ingenious, unexpected, and inventive. Maslow said that he just had to call her creative and that he had learned that a first-rate soup is more creative than a second-rate painting or poem.

Riessman (1962) has examined this problem from the perspective of the culturally deprived child. He believes that what the culturally deprived child needs and does not receive is respect. Too many people in society at large deprecate him and laugh at him. Thus, it may be that our deprecation of certain categories of people (such as women, Negroes, and culturally deprived children) may be causing us to lose much creative talent and to reduce the general level of creative behavior in our society. Such a clue comes from Ruth Wylie's (1963) study of the self-evaluative tendencies according to sex, race, and socio-economic status. She found that girls think less of their own mental abilities than do boys, that Negro children underestimate their mental ability more than do white children, and that children of lower socio-economic levels think less of their ability than children of upper levels. Wylie's conclusions are based on comparisons of self-estimates with actual performance on tests of mental ability. Although there are many possible explanations of these findings, it is quite likely that the reason may be that society in general deprecates girls more than boys, Negroes more than whites, and children from lower socio-economic levels more than those from upper levels. In other words, society teaches certain types of individuals that they are not as good as other children and erroneously gives them more cause for feeling inferior and for failing to develop their talents.

Questions About Evaluation in the Larger Environment

Of the many questions which we might have investigated concerning education's problem of creating an environment which places a high value on creative behavior, we chose the following, each of which will be discussed further in subsequent chapters:

1. To what extent do teachers reward or respect creative thinking in the classroom and what happens when they make a deliberate effort to do so?

2. In talking with children about their creative work, do teachers recognize and respect creative thinking?

3. Can teachers be trained to value creative thinking in the classroom with the result that their pupils will show greater growth in their ability to do creative thinking than will the pupils of their colleagues not so trained?

4. Does the teacher's own creative attitude affect the creative growth of his pupils?

5. To what extent does official sanction by the school principal affect the initiation of creative activities and creative growth among pupils?

6. Does the initiation of creative activities, irrespective of other factors, produce growth in creative thinking?

7. In what ways is the creative thinking of boys and girls rewarded differently?

External Evaluation

Power of Teacher as Evaluator

In conceptualizing the area of external evaluation, we shall be concerned primarily about the evaluative behavior of the teacher and the evaluative climate fostered by the teacher. It is our impression that teachers generally tend to underestimate the power of their evaluative behavior on the lives of their pupils. Teachers influence pupils through a great variety of evaluative behavior -- the kinds of tests they give, the way they react to the questions children ask and the ideas they produce, the grades they assign, the assignments they make, even the wording they give in making an assignment. In administering tests of creative thinking we have noticed how greatly slight differences in the wording of our instructions influence what the children will produce. For example, in administering a test which involves making a picture using a colored triangle as a major part, about 90 per cent of the children in the first grade will ordinarily use the triangle as the roof of a house. If we ask them to think of a picture that they think no one else in the class will think of and assure them that if they use their own ideas that what they produce will quite likely be different from the drawings of the others, almost none of them make the triangle a housetop.

Similar findings have been reported by other investigators. Hyman (1960), for example, found a significant increase in the number of unique responses when "be creative" instructions were given to engineers compared to the ideas they produced under "be practical" instructions. Loisellin Datta (1963), using a somewhat similar procedure, found that performance on tests of creative thinking can be significantly influenced by instructions. Most interesting, however, she found that the neutral instructions usually given in administering tests of creative thinking may decrease the power of the tests to discriminate among more or less creative individuals. In other words, the more creative individuals more than the less creative individuals tend to inhibit their creative thinking, unless they feel confident that original ideas will be acceptable.

Different Kinds of Evaluation at Different Educational Levels

Many educators believe that different kinds of evaluative behavior are appropriate at different levels of education. Mayer (1961) on the basis of observations in many schools points to what he sees as a great contrast between the practices of American and French educators on this point. Mayer maintains that in most elementary schools in the United States, teachers will consider most comments or answers given by children, but that an oral answer in the American high school receives a flat correct or incorrect evaluation. He sees the reverse as being true in French schools. In the French elementary school, all answers must be according to the book and are either correct or incorrect. The lycée, at least during the first four of the seven years, expects students to make at least occasional contributions to show that they are using their minds. In most of the studies involving children in the current series, we have included first through sixth grade.

Effects of Erroneous Evaluations

Since children apparently are influenced greatly by the evaluative behavior of teachers, incorrect evaluations can be as powerful as correct ones. Having erroneous evaluations causes teachers to behave towards children as though they have attitudes, abilities, and skills which they do not in fact have. I know of one student whose Intelligence Quotient and classroom number were transposed on his cumulative record card. As a result, his teachers and counselors treated him as though he were mentally retarded, although his Intelligence Quotient was actually 140. His teachers and counselors discouraged him from attempting any of the learning tasks which interested him. As a result, the boy had to seek the guidance of a college professor in a nearby college in pursuing his interests in science. At the time the boy was in the seventh and eighth grade, the college professor said that he wished his undergraduate science majors knew as much science as this youngster who was being treated as a retardate by his teachers. Fortunately this boy was able to find positive evaluation outside of his school and continued to learn as shown by outstandingly high scores on the science and mathematics College Board Examinations and by eight major awards at a national, state and regional level for creative achievement in science. His school grades continued to be poor, however, and his fellow students continued to regard him as a "dumb bell."

Fixedness of Evaluation

Lichter, Rapien, Seibert and Sklansky (1962) have called attention to the problem of altering the attitudes of the schools towards the youngsters in their drop-out study. They found that even though the youngster had changed through counseling and altered circumstances, teachers continued to perceive him as a troublemaker. They observed that the materials in cumulative record folders prejudiced the attitudes of new teachers and led them to discipline these youngsters far out of proportion to the offense. In our longitudinal studies of the development of the creative thinking abilities, I have observed amazing changes in a child's behavior after the teacher had learned that the child had made a high score on the test of creative thinking. The child had been considered a kind of hopeless case and had been relegated to the little group placed in the rear of the classroom to keep them from interfering with the classroom organization and procedures. Somewhat skeptically, but perhaps influenced by the "authority" of a score on a test of "creative thinking," the teacher began to ask the child questions which formerly he would not have thought of asking. As a result the teacher found that the child was learning more and was capable of a higher level of thinking than he had imagined.

Power of Peer Evaluation

Perhaps children would not be so greatly influenced by one teacher's evaluative behavior but for the fact that the teacher's evaluation also colors the evaluations of peers. Friedenberg (1959) believes that it is the relentless criticism and mockery of the peer group stimulated by the teacher which stamps out the originality and feeling expressed in children's writing. Teachers encourage children to be "carping" critics of one another's work, but they do not have to encourage it much. An example is given of one teacher who, perceiving an element of genuine literary merit in a child's writing, tried to arrest the flow of criticism and mockery long enough to point it out. The teacher was unable to do so. The evaluative behavior she had unleashed had gotten out of control.

Evaluation and Control

Much of the evaluative behavior of teachers appears to be designed to enable the teacher to control or coerce conformity to behavioral norms. Such evaluative behavior is not likely to have a positive influence upon any kind of truly creative behavior. Some teachers, like Hughes Mearns (1941), have observed that it is only when the child is convinced that you are not trying to reform him that he is able to open up and behave creatively. He found that when children found he was there to enjoy and to share their productions that "they opened up a surprise box of truthful observation and offered wise deductions that belied their years" (p. 3). Much scattered evidence seems to suggest that creative thinking flourishes most when students feel that the teacher is on their side. Handlin (1962) believes that having to give grades subjugates the teaching role to the grading role. He contends that it destroys the intimacy of the relationship between the teacher and student. The student becomes afraid to turn to the teacher, fearing that he will be evaluated in the process.

Evaluation and the Stimulating Environment

Generally it has been thought that teachers should provide a stimulating environment to elicit creative thinking. This concept is compatible with the stimulus-response theory of learning. The belief in a stimulating environment has resulted in a multiplicity of lists to guide teachers in stimulating children to "be creative." The following is an example of eleven suggestions for encouraging children to write creatively (Baker, 1952):

1. Use praise.
2. Encourage a child's new idea.
3. Have a poetry drawer or box.
4. Do not pay too much attention to rhyme and meter if the thought is good.

5. Have a quiet hour each week.
6. Give daily invitation to write.
7. Consider the individual child; do not give mass assignments.
8. Prepare for the writing period by discussion or thought sharing.
9. Lead the children into writing; never push.
10. Make stories and poems together as a class, sometimes.
11. Mimeograph a booklet of the children's writings; see that each is given a copy.

While these suggestions manifest a great deal of respect for the individuality and creative aspects of a child's being, they reflect a basically stimulus-response orientation, somewhat in contrast to the responsive environment orientation. Other writers, like Mauree Applegate (1949), maintain that children will often react more creatively to teachers who are receptive than to those who are continually stimulating.

Evaluation and The Responsive Environment

There has been much misunderstanding about what is involved in creating a responsive environment for creative thinking. Some equate it with permissiveness. Others equate it with a laissez faire approach. Actually, the creation of a responsive environment involves a great deal of guidance, as will be indicated by the following characteristics identified by Ferebee (1950):

Building an atmosphere of receptive listening
Relieving the fears of the timid and the overtaught
Fending off negative criticism
Making children aware of what is good
Stirring the sluggish and deepening the shallow
Making sure that every sincere effort, however poorly executed, brings enough satisfaction to the child to enable him to want to try again
Heightening sensory awareness
Keeping alive zest in creative activity
Being wise enough to halt the activity temporarily when creativity runs thin.

A basic problem in providing a responsive environment is that many teachers do not genuinely respect individual differences. Some well-meaning ones think that they are being respectful of differences when they are merely tolerating them. As Blanche Jefferson (1959) suggests, merely tolerating differences indicates that the differences are distasteful and that we have to put up with them. Respect cannot be shown until the teacher recognizes that each child is unique and is glad to have the daily opportunity of enjoying the expression and development of each child's uniqueness.

Questions About External Evaluation and Creative Behavior

Out of this background of issues and problems, we selected for exploration and testing the following questions:

1. How does the nature of the evaluative behavior of the adult given during a practice period affect the quantity and quality of the productive thinking of children in subsequent and related activities?

2. Is an initial period of experimentation and testing of ideas without external evaluation more conducive than immediate external evaluation in the subsequent production of original ideas?

3. Is peer discussion of defects following a practice exercise more conducive than peer discussion concerning constructive possibilities to the subsequent production of original ideas?

4. Does competition stimulate creative thinking?

5. What strategies do members of small groups of children use in controlling the production of their more creative members and what counter strategies do creative persons employ in coping with the coercive strategies of the group?

6. How does homogeneous and heterogeneous grouping affect the strategies of small groups in controlling their most creative members?

7. What type of evaluative thinking characterizes the behavior of effective teachers, as assessed by pupil learning?

Evaluative Behavior of the Individual

Neglect of Self-Evaluation

In view of the value which society places upon self-confidence, it might be regarded as surprising that educational procedures give so little attention to having pupils judge the value of their own work. Teachers usually do all of the evaluating and perhaps get more experience in evaluating the work of others than any person should have. Many students of human behavior (Rogers, 1951; Maslow, 1954; Murphy, 1961) have given a place of great importance to the self-concept as a determiner of behavior. Both as a condition for constructive creative behavior and for psychotherapy, Rogers has emphasized the importance of the internal locus of evaluation. He feels that the value of a product is established by the creative person himself. Boraas (1922) maintained that next to the ability to produce an idea or some other piece of work is the ability to estimate its worth. Gardner Murphy (1961) believes that to free children to achieve their potentialities, teachers must help them to believe in their own individuality and their capacity to learn.

In spite of this overwhelming sentiment among psychologists and educators concerning the importance of the self-concept in creative behavior, there is little empirical evidence outside the clinical field to indicate that there is a relationship between self-concept and creative functioning. An interesting study reported by Pauline Sears (1960) does supply some evidence for such a relationship among boys in the middle childhood years. Her data indicate that high self-concept boys, as compared with the low, made higher scores on several tests of creative thinking, scored higher on need achievement, showed a more favorable attitude toward school subjects and activities, and were rated higher by their teachers in intrinsic interest. They did not differ, however, on achievement test reading scores, being liked by others, and observed work habits. These results suggest that creative behavior may be more dependent upon the self-evaluative behavior of the individual than is school learning such as reading.

Development of Self-Concept and Creative Behavior

The development of the self-concept as it relates to one's creative powers is a continuous process and does not result from a single earth-shaking experience. Ruth Griffiths (1945) who studies the development of the imagination in early childhood describes it as a process of continually measuring one's strength against external forces. She found that children experiment continually and learn by hard and bitter experience what they are capable of doing. A critical stage in this development is when the child for the first time begins to recognize his personal separateness. Before this, children presume that all people think and see alike, namely as they themselves do. Immature adults either maintain this viewpoint believing that everyone thinks as they do or reach a point when they are unable and unwilling to trust their own perceiving and thinking and depend completely upon someone else.

Many of those who work with college students and adults maintain that there are too many of those who depend entirely upon authorities outside of themselves for all thinking. Monica Lawlor (1962), for example, observed, "Half of the people who get into universities in this country would rather be seen dead than thinking for themselves" (p. 72). She concedes, however, that such individuals may fit admirably into a society which feels that thinking is indecent anyway. Kettering (1944) has described the problem as it related to the recruitment and development of creative engineers or inventors. He refers to one survey which showed that if a person had an engineering degree or a scientific education, the chance of his making an invention was only about half as great as if he did not have the specialized training. Kettering's response is that the inventor simply does not take his education too seriously and is willing to experiment and look for new solutions.

We have many clues that the difficulties cited by Lawlor and Kettering spring from the many things in society and education which interfere with a child's struggle to build up a schematic view of his own. We are too unwilling to take risks with them, too unwilling to permit them to learn how to fail intelligently. Kettering points out that an inventor may try and fail a thousand times, whereas the student who fails once is out. Apparently very young children can learn to evaluate their own work. Audrianna Allen (1963), for example, reports that five-year olds can think creatively and that such thinking is more likely to occur when the children evaluate their own work.

Socially Disapproved Behavior and Creativity

The handling of a number of socially disapproved kinds of behavior also seems to have a great deal to do with a child's self-concept of himself as a creative person. One such problem is that of copying from other children. Blanche Jefferson (1959) insists that when children are made to feel proud of their independence, they will not want to copy ideas from others. She also feels that the child has a right to protection against having his ideas used or copied by another. Lying is one type of creative -- or at least imaginative -- behavior which is socially disapproved. Our social disapproval of such behavior may blind us to its true meaning to the child -- a creative, though disapproved, solution to a problem. Although a teacher may disapprove such behavior she might at least recognize in it the manifestation of an ability which, if properly guided and developed, might be quite useful.

Importance of a Strong Self-Concept

The importance of having a strong self-concept is reflected in a number of the findings from studies of the personalities of highly creative people in various fields. MacKinnon (1961) found that the highly creative people he and his associates studied are characterized by an unwillingness to accept anything on the mere say-so of instructors. Nothing was to be accepted because it had the voice of authority behind it. MacKinnon also concluded that because the creative person is not preoccupied with the impression he makes on others and is not over concerned with their opinion of him, he is freer to be himself than most people. He is not socially irresponsible, however, and is not deliberately nonconformist. The Goertzels (1962) found that a willingness to take risks characterized the 400 eminent creative people whom they studied.

Helping Children Develop Self-Concepts

From the observation and studies of people who have worked with children in creative activities and who have studied the lives of creative people, we also derive many clues about how they might be treated to give them a better chance to develop self-evaluative attitudes more conducive of creative behavior. Most children like to talk about their creative activities and it is difficult to prevent some of them from doing so. Through such talk they clarify and develop their self concepts as they relate to their creative functioning. It is my own observation that all, or almost all, children really desire and need such opportunities. Those silent ones who say little about their creative activities may have difficulty in developing healthy attitudes concerning the value of their ideas. In listening to children, young people, adults, or old people, it is important to remember that the originator of a novel solution needs to make a good argument concerning it. After being made to look bad, Allen (1962) reminds us, the originator of the novel idea is likely to present more standard, less original solutions. Thus, one of the studies in this volume will deal with the problem of talking with children about their creative productions.

Sometimes we assume that the individual who is accepted by his group is freer to think creatively than is the person who is rejected. Research by Julian and Steiner (1961), however, suggests that much depends upon the manner in which the members of a group are interdependent. Their findings indicate that high acceptance by the group is associated with low conformity in groups where each member's success promotes the success of other members and in groups where each member's success decreases the likelihood that other members will also be successful. High acceptance tends to be related to high conformity, however, in groups in which the success of one member is unrelated to the success of other members. These and other findings suggest the importance of studying groups and social influences on creative thinking. Thus, in one study of the present series we shall seek to examine the ways in which groups influence the evaluative behavior of individuals.

A number of studies have suggested that freedom to engage in self-initiated activities and learning are essential to creative achievement. The Goertzels (1962) cite evidence to indicate that their eminent subjects had greater freedom to engage in self-initiated projects than did more conventionally reared children in their own times. Buhl (1961) found that this was also true of the creative engineers he studied. He also found that his creative engineers were not so subject to constant evaluation as were their less creative colleagues. They were freer to make mistakes and to develop confidence in their own problem-solving. Riessman (1962) and others remind us that society's worship of the well-rounded person may also do damage to the self-concept of the culturally deprived child who may manifest a single-minded kind of creative talent. He believes that although this form of creativity may be found in any social group that it has greater relevance in working with underprivileged who have fewer opportunities to develop in a variety of areas.

Relevant to our discussion of well-roundedness and conformity in general is Thoreau's often quoted statement which comes very close to the central issue:

> "If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music which he hears, however measured or far away" (Thoreau, 1942, p. 216).

Questions About Self-Evaluation and Creative Behavior

Out of our consideration and other issues related to the evaluative behavior of the individual and his creative thinking, we decided to explore the following questions in the present studies:

1. In evoking original ideas and in developing them, is it more helpful to provide practice in suggesting improvements, making different interpretations, and the like, or in identifying defects?
2. Does a receptive, a critical, or a creative set in doing reading assignments affect the nature of achievement as measured by tests?
3. Does having a creative or a critical attitude affect differentially achievement on tests requiring different types of mental operations?
4. How do children perceive divergent behavior and society's evaluation of such behavior?
5. Does encouraging children to form the habit of writing down their own ideas contribute to creative growth and an increase in the individual's valuation of his creative achievement?
6. What happens when credit is given for self-initiated learning?

Chapter 3

BACKGROUND PROBLEMS IN THE MEASUREMENT OF CREATIVE BEHAVIOR

Since most of the instruments which have been used in this study involve in some way the measurement of creative behavior, this chapter is devoted to a brief historical perspective concerning this field of measurement, some of the developmental work which preceded the studies described in this report, and some of the measurement issues as we have tried to deal with them. A more detailed treatment of these problems will be found in Guiding Creative Talent (Torrance, 1962a), so only enough information will be given in this chapter to provide perspective. An effort has also been made to identify more clearly the issues that are involved in the measurement of creative behavior than was possible when Guiding Creative Talent was written. After all, the work on which Guiding Creative Talent was based preceded the studies which constitute this volume.

Attention has been given to the problems of measurement and instrumentation because I believe that an understanding of the ideas behind the instruments used is necessary for an understanding of the meaning of these studies and for an honest evaluation of them.

Historical Perspective

Even before the turn of the century, and again in the 1920's and 1930's, interesting and exciting attempts were made to develop tests for measuring the creative thinking abilities and identifying creative talent. It was clear from most of this work and the research which accompanied it that the measures which were devised tapped different aspects of mental functioning and identified different intellectual talents from those involved in traditional tests of intelligence or scholastic ability. These efforts attracted very little attention, however, and there were no sustained research and development efforts to make these measures of much practical use either for research or operational programs.

Since most of the efforts of the past have been limited to a particular age or educational level, it seems necessary to review these developments in terms of early childhood, the elementary school years, the high school years, and adulthood.

The Early Childhood Years[1]

Many scholars have continued to deny the possibility that children can think, in many cases erroneously equating the terms "think" and "reasoning." A great majority of the early studies of "creative imagination," "creativity," or "creative thinking," were limited to artistic manifestations of creativeness. Early investigators limited their observations of creative behavior quite severely. Their research reflects little recognition of the fact that no single test or area of observations taps all of the individual's resources for creative thinking and that the same test or kinds of observations are not valid or adequate at all age levels.

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[1] Much of the material included in this section was originally prepared as a part of a project on the status of knowledge about Creative Scientific Talent, directed by Calvin W. Taylor, University of Utah, and supported by the National Science Foundation, June 1961.

A variety of methods have been used to assess the creative functioning of young children. Whipple's 1915 *Manual of Mental and Physical Tests. Part II: Complex Processes* describes an ink blot test of creativity, apparently based on the earlier work of Kirkpatrick (1900). Whipple also mentioned the work of Stella Sharp who conceptualized two types of creativity: (1) the constructive or imaginative type which puts together concrete details in such a way as to form a significant new whole and (2) the matter-of-fact or scientific type. McCarty (1924) based her instruments for assessing creativity in children on drawings; Abramson (1927) used ink blots and concrete observations; Grippen (1933) used paintings and verbalizations while painting, a procedure called the "constant contact method."

Andrews (1930), in a rather careful developmental study, used a great variety of methods and observations and classified a variety of types of imaginative or creative behavior. Three of her tasks were presented tachistoscopically with instructions to form new products (transformations). The following kinds of observations were made of the imaginative play of children from two to six: imitation, experimentation, transformation of objects, acts of sympathy, dramatizations, imaginary playmates, fanciful explanations, fantastic stories, new uses of stories, constructions, new games, extensions of language, appropriate quotations, leadership with plan, and aesthetic appreciation.

Markey (1935) employed observational methods to evaluate performance in a variety of standardized situations and tasks, such as a housekeeping game, the fanciful naming of visual stimuli, leadership in imaginative games, block-building, and the like.

In all of these early attempts to measure creative behavior, the correlation tends to be low between such measures and traditional measures of intelligence. Markey sought to explain away in various ways the relatively low correlation between mental age and creative behavior. Andrews recognized more clearly the difference between the two types of measures and concluded that "very little relationship exists between intelligence and the fantastic imagination of the young child." One might wonder why Binet did not include in his battery of intelligence test tasks measures of this type. In his 1909 book on new ideas about children, he certainly emphasized the importance of creative behavior, imagination, inventiveness, and the like. In fact, many of the exercises which he called "mental orthopedics" and used with mentally retarded children resemble quite closely some of the current tests for assessing creative behavior. It is quite likely that he was blinded to the inclusion of measures of this type because he was committed to a mental age concept of development and such measures have never fit the mental age concept very well. Kirkpatrick (1900), for example, found a sharp drop between the third and fourth grades, and Andrews (1930) found a drop between four and one-half years of age and age five. (A drop between the third and fourth grades has been noted by an even larger number of investigators.)

The Elementary School Years

Of the many manifestations of creative thinking among children during the elementary school period, greatest attention has been given to creative writing and art. Throughout history, in spite of "holding back operations" which seem ever with us, there have been dramatic examples of outstanding creative achievement at a tender age. Louis Braille (Kugelmass, 1951; Henri, 1952; Roblin, 1951), at about the age of ten, became obsessed with the idea of developing a better system of writing for the blind, and by the time he was fifteen he had practically perfected the method which now bears his name. Newton spent his childhood making water clocks and windmill models. James Hillier constructed his first microscope as a boy.

Investigators of creative behavior during the elementary years have also seriously limited the scope of their observations of the manifestations of creative thinking, thereby limiting the accumulation of knowledge about creative thinking during this period. Also, failure to accept socially undesirable behavior as indicating creative potential has eliminated consideration of large areas of childhood behavior.

Although a variety of measures have been used in studying the creative behavior of elementary school children, no single investigator has applied a large range of measures with a single sample of subjects. Typical of early efforts was Kirkpatrick's (1900) with ink blots. Colvin (1902) used compositions, giving attention to such qualities as invention, sense of humor, imagination, and perceptive power. Simpson (1922) used fifty sets of four small dots, representing the four corners of squares, as the stimuli for constructions which were used in assessing fluency, originality, and flexibility. The methods of McCarty, Abramson, and Grippen were used with both pre-primary children and elementary school children. Harms (1939) employed a test requiring the representation of words (mostly various actions) by single lines in grades one through twelve. Stephenson (1949) reports the use of a poetry-writing test and an art form test.

The High School Years

Although a few creative scientists, writers, and inventors have won eminence while still of high school age, the number has been too small for extensive study. In most cases, they achieved their eminence outside of the high school setting. Arturo Toscanini, Werhner von Braun, Galileo Galilei, and Edna St. Vincent Millay (Freedman, 1961) are examples of a few who achieved creative eminence in their teens. High schools have long had provisions for recognizing creative writing and speaking talent. In recent years, there have been many provisions for recognizing scientific and inventive talent. The National Merit Scholarship Corporation (Holland, 1961) has developed scales both in the sciences and in the arts which incorporate a variety of these kinds of achievements.

Devices for assessing the creative thinking abilities of high school pupils have tended to be in the direction of group administered tests with verbal stimuli requiring verbal responses. Although some of the instruments originally developed for use with children have been extended into or through the high school years, most of the instruments used with high school students were initially developed for use with college students or adults.

Colvin (1902) made more use of his measures based on compositions with high school students than with younger persons. The Abramson, Harms, and Stephenson instruments, already mentioned, have been used with high school subjects. M. D. Vernon (1948) used her Imaginative Construction Test (stories based on four colored pictures) with high school students.

Most of the recent studies involving high school students have made use of adaptations of a few of Guilford's tests, primarily his tests of divergent production abilities. Getzels and Jackson (1962) used four adapted tasks (Word Associations, Uses for Things, Hidden Shapes, and Fables) and constructed one of their own (Make-Up Problems). McGuire, Hindsman, King and Jennings (1961) and Piers, Daniels, and Quackenbush (1960) used selected tasks from Guilford's battery. Guilford, Merrifield and Cox (1961) administered Guilford's extensive battery to ninth-grade students and found essentially the same factors as they had found previously with adults.

The College and Adult Years

Undergraduate college students produce almost all types of creative products -- inventions, medical discoveries, books, monographs, poems, musical compositions, dramas, operas, and the like. Usually, however, such manifestations occur outside of official college requirements and activities. The well-known term paper is usually a digest of known facts or opinions of experts and is graded primarily for correctness of form and content. Dissertations and theses, usually regarded as original contributions, tend to be evaluated in terms of the correctness of the methodology rather than in terms of originality, inventiveness, and worth of the ideas developed and tested.

One of the most dramatic exceptions has occurred in the field of medicine. The rich tradition of discoveries by undergraduate medical students has been called to our attention by W. C. Gibson (1958) in his book, Young Endeavour. This collection consists of rather compressed biographical sketches of approximately 130 medical students who made significant scientific contributions. Their discoveries were made while they were still undergraduates or they conceived of the idea during this period and worked it out later.

Although there has been practically no experimentation by colleges with measures of creative thinking as a functional part of programs, a great variety of such measures have been applied in studies with college students.

In 1916, Laura Chassell reported rather detailed data concerning the following battery of twelve tests of originality: Word Building, Picture Writing, Analogues, Original Analogies, Chain Puzzle, Triangle Puzzle, Royce's Ring, Completion Test, Economic Prophecies, Code Test, Invention for Sheet Music, and Novel Situations (Consequences). In his 1922 book, Burt described and discussed the following eight types of tests of "imaginative thinking": interpretation of ink blots, word-building, sentence-building, making metaphors or similes by combining any two of a series of words, completion of mutilated sentences, painted cube test, imaginary journey test, and production of rhymes.

Hargreaves (1927) used twelve tasks which he scored for fluency and originality: Word Building and Composition, Ebbinghaus Test, Invention of Stories, Indeterminate Picture Completion, Unfinished Pictures, Ink Blots, Indeterminate Language Completion, Unfinished Stories, Writing Words, Probable Situations, and Imaginary Situations. Maier and his associates (McCloy and Maier, 1939) experimented with a variety of measures closely related to their interest in art education. They have included such tasks as interpretative titles to pictures, critical appraisal and interpretation of completed works of art, compositions, and opinions and interpretations of paintings. Welch (1946) developed tasks which emphasize the perception of new combinations. His tasks include: block constructions (make as many pieces of furniture or home furnishings as possible from ten blocks), sentence construction (from ten words), letter construction (from three straight lines), and short story construction.

Owens, Schumacher and Clark (1957) developed a series of tasks to assess creativity in machine design. The test tasks include: Power Source Apparatus Test, Design-a-Machine Test, Three-Dimensional Space Relations Test, and Figure Matrices Test. Harris (1960) has developed two forms of a 20-item test of creativity in engineering which has been standardized on engineering students. The content is oriented to engineering and the tasks require subjects to list possible uses of various objects and to guess "What is it?" Buhl (1961) and others both in higher education and in industry have used the AC (Sparkplug) Test of Creative Thinking Ability among engineering students and various adult groups. This test includes problems calling for unusual uses of common objects, alternative explanations of conclusions, consequences of unusual occurrences, alternative solutions to problem situations, and the like (Harris and Simberg, 1959).

Barron (1958) and his associates at the University of California have developed a battery of tests for assessing originality, which includes Mosaic Constructions, Anagram Test, Drawing-Completion (French), Figure Preference Test (Welsh), and Ink Blot Test (uncommon responses). Other instruments which have been used with college students and other adults include: Flanagan's (1963) Ingenious Solutions to Problems, one of the few attempts to assess creative thinking through multiple-choice items; Frederiksen's (1959) Formulating Hypotheses Test, an attempt to elicit creative-type responses and transfer them to machine-scoreable answer sheets by having subjects code their own responses; Burkhart's Object Question Test (Burkhart, 1962; Burkhart and Bernheim, 1963) which requires subjects to ask divergent questions about a given object such as an apple or paper clips; and Mednick's (1962) Remote Associates Test which requires subjects to find a word which is an associative connective link between three disparate words.

Guilford's elaborate battery was originally devised for high level personnel. Thus, it has been used largely with college and professional-level subjects. Because of its lengthiness, most users have selected only a limited number of the test tasks. This work has been done within the framework of Guilford's "Structure of Intellect Model" (Guilford and Merrifield, 1960). The most recent conceptualization of the creative thinking abilities includes the following factors and there are several tasks to assess each: sensitivity to problems, flexibility (figural spontaneous, figural adaptive, and semantic spontaneous), fluency (word, expressional, and ideational), originality, elaboration, redefinition (figural, symbolic, and semantic).

As with pre-school, elementary school, and high school subjects, studies involving college and adult subjects have shown uniformly rather low relationships between measures of creative ability and measures of intelligence and scholastic aptitude. In general, the findings reported by Hargreaves in 1927 have continued to be supported. When he scored his tests of imagination for fluency of ideas, with emphasis on quantity rather than quality, he obtained fairly high correlation with intelligence tests. In addition to the appreciable amount of the general factor "g" he found a considerable group factor in common with other measures of imagination. The "speed" factor was also found to be important in fluency. When the same test responses were scored for originality, denoting novelty and uncommonness, Hargreaves found very little relationship. Barron (1957) reported a coefficient of correlation of .33 between his measure of originality and the Concept Mastery Test. Bentley (1960) obtained a coefficient of correlation of .11 between the Miller Analogies Test and a battery of the Minnesota Tests of Creative Thinking and Palm (1959) found correlations of .10 with the Miller Analogies and -.02 with the Ohio State Psychological Examination and a battery of the Minnesota Tests of Creative Thinking among graduate students in education.

Early Development of the Minnesota Tests of Creative Thinking

Early in 1958, Sue Beth Chei, Kenneth DeYoung, and I began simultaneously to survey what had been accomplished in the development of measures of creative thinking and to immerse ourselves in the lives and experiences of recognized creative persons through their autobiographies, biographies, and other writings. Approximately one and one-half years of developmental work preceded the studies which constitute this report and it seems necessary to review this early work in order to understand the ideas behind the measurement instruments which have been employed.

Test of Imagination, Forms A and B

In trying to design measures of the Creative thinking abilities, we felt that we needed a set of tasks which could be administered from kindergarten through graduate school, tasks which would challenge the graduate student and have a high ceiling and at the same time be easy enough to elicit creative responses from the kindergartener. Since we were at that time inexperienced with tests of creative thinking, we decided that our first attempts should be with materials about which something was already known and which had a sound theoretical rationale. Thus, we attempted first to adapt Guilford's (Guilford, Wilson, Christensen, and Lewis, 1951) materials with our objectives in mind. For example, we tried out several substitutes for "bricks" in Guilford's Unusual Uses Test, objects more common to the experiences of children. Our experimentation suggested that "tin cans" would be suitable for our purposes.

At first, we were extremely modest in our requests for testing time in schools. As a result, our first batteries consisted only of six tasks. Form A consisted of the following tasks: Unusual Uses of Tin Can, Impossibilities (as many as you can think of), Consequences (if man could become invisible at will, if a hole could be bored through the earth, if birds and animals could be understood by man), Situations (handling a friend who kids others but cannot stand to be kidded, a charge of dishonesty in a club, and becoming educated if schools were abolished), Common Problems (taking a bath and doing school homework), and Improvements (bicycle, shoes, and children's clothes). Form B, designed as an alternate form, consisted of the following tasks: Unusual Uses of Books, Impossibilities for People, Consequences (if our days were twice as long as they are, if a man could live forever on the earth, and if men could fly without mechanical aids), Unusual Uses of a Pencil and Shoes, Common Problems (making a sandwich and getting to school in the morning), and Improvements (coats, telephones, and skates). Initially, we attempted to score each task for fluency, flexibility, and originality.

We were pleased with response to these tasks at the fifth-grade level and above. Some evidences of validity were found for them on the basis of their ability to differentiate those nominated by peers and teachers as having a "lot of good ideas" and other criteria of creative behavior from those not so nominated. Also, children identified as outstanding on these tests were found to differ in meaningful ways from their classmates of the same sex and equal mental age as measured by intelligence tests such as the Stanford-Binet, the Kuhlmann-Anderson Intelligence Test, the California Test of Mental Maturity, and the Otis Quick-Scoring Mental Ability Test. The work of the highly creative children compared with their equally intelligent classmates (Torrance, 1962a, p. 78) is characterized by humor, playfulness, relative lack of rigidity, and relaxation. Products produced outside the test situation were rated as more original, more "off the beaten track." They also had reputations among their peers and teachers as having wild or silly ideas, especially the boys. Coefficients of correlation with "traditional" measures of intelligence were quite small, in most cases not statistically significant. Yet there were statistically significant relationships between these measures and standardized measures of achievement even after the effects of mental age had been partialled out.

Test of Imagination, Form C

We were not satisfied with the responses obtained from these two batteries from children in the fourth grade and below. We decided that we must develop a different set of material for younger children which might possibly be useful with older subjects as well. We then started experimenting with two types of materials: the improvement of toys and alternative solutions to some of the Mother Goose problem-situations. We thought that the toys would challenge the ingenuity of children, give them some concrete object to work with, and elicit their personal involvement and interest. Subjects were asked to think of ideas for improving each toy so that it would be more "fun to play with." This invitation to regress (to have fun) was an important part of the instructions and represents an attempt to apply the concept of "regression in the service of the ego" as it relates to creative behavior. Responses provided quantifiable data for assessing several kinds of thinking ability. Fluency was determined by counting the number of relevant ideas produced, ideas which are to some extent adaptive to reality. We found that flexibility can be reliably assessed by analyzing the responses in terms of the number of approaches used in modifying the toy. These include the well-known Osborn (1957) principles of addition, subtraction, multiplication, division, substitution, combination, magnification, rearrangement, reversal, sensory appeal (motion, sound, light, odor), and the like. Scores on inventive level, constructiveness, and, later, originality were developed.

Sex Appropriateness of Tasks

A number of fundamental measurement problems were investigated from the very outset. For example, in using toys for the product improvement test, questions arose concerning the matter of sex appropriateness of the toys. We used a nurse's kit as a typically female toy, a fire truck as a typically male toy, and stuffed dog as a toy having no special sex taint. As we had hypothesized, there were sex differences in the number of ideas produced for improving the nurse's kit and the fire truck but not for the stuffed dog. Thus, we decided to adopt the stuffed dog as the test stimulus for this task. It should be mentioned that the third grade boys scored significantly higher than girls on all three toys.

Manipulativeness

In the individual administration of this test, administrators observed that some children picked up the toys during the testing and manipulated them while others did not. We then ran one-way analyses of variance using degree of manipulation as categories of classification (none, moderate, and high or intense). There were in each grade significant differences in mean fluency and flexibility scores among those respondents classified as showing low, medium, and high degrees of manipulation. There were also significant differences between those who engaged in some manipulation and those who engaged in none [illegible] flexibility. (Other scores had not been developed at this time.) It was also found that boys engaged in more manipulation of the toys than did the girls. These findings were interpreted as favoring the provision of actual toys and encouraging subjects to manipulate them as a part of the instructions for individual test administration.

The Ask-and-Guess Test

As we began administering the three test batteries just described it struck me that none of the tasks really gave an opportunity for the subject to express his curiosity, reveal his sensitivity to defects or gaps in knowledge, or demonstrate his ability to formulate hypotheses about causation. Thus, I developed the idea of showing the subject a picture, having him first to ask all of the questions he could think of about the events depicted and then having him make guesses concerning causes and consequences.

It seemed to us that much of the essence of creative scientific thinking is captured in the processes of asking and guessing. Such a concept is in harmony with the definition of creative thinking offered in the first chapter, as the process of sensing deficiencies, forming ideas or hypotheses, testing them, and communicating a result. Curiosity has long been accepted as an important aspect of creative behavior and is recognized as being reflected in the number and kinds of questions asked. Scientific thought has long divided the phenomena of nature into two series: causal conditions and the results or consequences.

In the original manual (Torrance, 1962a, pp. 222-230), we set forth a somewhat detailed rationale, described the materials, administration procedures, and scoring procedures, all of which have continued to undergo development and refinement. About a dozen pictures were pre-tested before we finally settled upon a pair of appealing human interest pictures: Tom, the Piper's Son, stealing a pig and being chased by a farmer and Ding Dong Bell, a picture of two boys and a girl putting a cat in a well. Other pictures have been used with special groups, but the above two pictures are the ones used in the present set of studies.

Subjects are told that this is a test of how curious they are about the world in which they live and of how good they are at guessing causes and results or consequences. In introducing the first part, the examiner states that the main way we show our curiosity and obtain information is by asking questions. They are then instructed to think of all the questions they can about what they see in the picture. They are encouraged to ask questions about any or all parts of the picture and of the event pictured but are cautioned to ask only questions which cannot be answered by looking at the picture. In the instructions for hypotheses concerning causes, subjects are told that they cannot always obtain the information they want by asking questions; there are times when they must make guesses and then test their guesses through further investigation. They are then instructed to make all of the guesses they can concerning the possible causes of the events depicted. Similarly, for the third part, subjects are directed to give as many possible consequences as they can of the action shown in the picture.

group test to older persons. A time limit of five minutes for each of the three parts has been used in the studies in the present series. Studies by Bradley Sagen and me show significant differences between individual and group administrations in the fourth, fifth, and sixth grades. The mean number of responses on each part is significantly higher in the individual administration than in the group administration. We also found that some children profit more than others from one or the other types of administration. For example, the reliability coefficients for oral (individual) versus written (group) administration are .61, .46, and .54 respectively for the fourth, fifth, and sixth grades. In other studies using alternate forms (different pictures) of the Ask-and-Guess Test, test-retest reliabilities of .76 (McGreevey, 1961), .79 (Torrance, 1960c), and .85 (Yamamoto, 1962) have been reported.

Non-Verbal Tests

At about this same time, a number of considerations made it highly desirable to develop non-verbal measures of creative thinking. First, it seems quite likely that non-verbal types of creative thinking are important for the same reason that other kinds of creative thinking are important. Second, the individual administration of an adequate battery of tests of creative thinking is tremendously time-consuming. Non-verbal tests of creative thinking which could be administered in a group would contribute something to the solution of this problem. Third, some highly creative children appear to lag in their development while others are shy and fearful about voicing their ideas even in an individual testing situation with the best efforts to establish rapport. It was believed that non-verbal measures as a supplement to verbal mesures might compensate for some of this deficiency.

Although we have by now extended this exploration into a variety of areas, we had developed only two non-verbal tasks at the time the present studies were undertaken. Two others were developed as a part of this project and will be described later in this chapter. The first is a measure involving the number of extra details or ideas put into drawings of a house, tree and person. The other is the Circles Test and its alternate form, the Squares Test.

The Extra-Details score is an index developed on the basis of Buck's (1948) qualitative interpretation of the House-Tree-Person Test. It was thought that the number of additional or extra ideas (beyond minimum requirements) put into drawings of a house, a tree, and a person would provide one evidence of divergent thinking, ability to go beyond the obvious. The number of essential details might provide a measure of convergent thinking. Although coefficients of correlation between these two measures (essential details and extra details) and measures of intelligence and creative thinking are small, there was a consistent tendency for essential details to be more closely related than extra details to mental age. There was also a consistent tendency for extra details to be more closely related than essential details to other measures of creative thinking. Details such as roof, walls, door, chimney, window for house; trunk, foliage for a tree; and eyes, mouth, nose, arms, hands, legs, feet, hair, and clothing for a person were judged as essential. Other recognized additions have been identified as extra details.

Findings of the personality studies of highly creative children compared with less creative children of the same sex, mental age, and race indicated that the Extra-Details index is a highly differentiating characteristic of creative children both when the total number of non-essential details and the number of unique or unusual details were considered. Differences between the drawings of the highly creative and the less creative children were statistically significant at the one per cent level of confidence.

The other non-verbal measure -- and one used in several of the studies presented in this volume -- is the Circles Test. The original format consisted of a page filled with 42 circles, each one inch in diameter. Although a number of modifications have since been made both in the format and in the instructions, the subjects in the earlier studies were simply directed to "see how many objects they could sketch which have a circle as the main element in their design."

Initially, only three aspects of divergent production were assessed through this task; fluency, flexibility, and originality. Fluency was determined by counting the number of different ideas produced on a circle or circles without duplication. Flexibility was determined by counting the number of categories into which responses fall. Some of the more common categories include: human faces or heads, animal faces or heads, human figures, animal figures, coins, fruit, and the like. Originality included all responses not appearing in a list of highly frequent ones. The initial list included the following: clocks, flowers, human faces, wheels, tire, sun, and doughnut. A much more detailed scoring guide has now been developed on the basis of tabulations of the frequency of responses in the records of several hundred subjects. Later, responses were evaluated in terms of several other criteria such as communicativeness, complexity, elaboration, and the like. At the present time, elaboration is the only one of these which has been retained and the scoring procedures and rationale for this dimension will be presented in the next chapter.

Concept of Inventive Level

Since the concept of inventive level as defined by the U.S. Patent Office enters into the evaluation of a number of the products which resulted from some of the experiments in the present series, mention should be made of our early work with this concept. We had thought that we could obtain a more powerful measure of creative behavior by scoring based on logically meaningful but complex sets of criteria. We believed that the practical criteria for "patentable" creativity might be adapted to develop a scoring measure of productions resulting from a task designed to stimulate creative thinking.

This scoring concept was applied first to the Product Improvement and Unusual Uses Tests involving the stuffed toy dog. After much discussion and trial-and-error, we decided upon six basic points with which to judge each response:

1. Newness and novelty
2. Usefulness
3. Productive and thought-provoking
4. Challenging ideas
5. [illegible]
6. Quality of being well thought out.

The use of definitions of these six characteristics did not result in satisfactory inter-scorer reliability. We then compiled a list of responses of some 200 records and scored each response by consensus of raters. By referring to this list we attained inter-scorer coefficients of reliability of .92. This procedure proved to be rather time consuming, however, so Necla Palamutlu worked out a simplification trying to maintain as much as possible of the power of this complex scoring concept. She did this by grouping related responses into broader categories.

The Patent Office criteria of inventive level have also been applied to the new ideas produced by graduate students in a teaching experiment. After experimenting with various combinations of these criteria, we finally settled upon ten-point scales attempting to rate the following qualities of the products submitted:

1. How much creative strength or qualified intellectual energy was involved in solving the problem?
2. How useful would the idea be, if executed or found tenable?
3. Does the idea represent a step forward or advance over present knowledge, theory, or practice?

4. How much originality was used in overcoming a special diffculty? How close have others come to the same solution?
5. How surprising or remarkable is the solution suggested? How shocking is it?
6. How adequate is the statement of the idea and proposed plans for its development?

Lives of Eminent Creative People as Data

As we have developed and experimented with dozens of other approaches for assessing creative behavior, we have at every turn endeavored to keep ourselves grounded in reality by checking our cues against the experiences of recognized creative people, living and dead. Kenneth DeYoung and I tried to apply our insights from data concerning eminent creative persons in constructing a life experience inventory which could be used in studying adolescents and young people. Circumstances have not permitted us to follow through with this proposed work. Having immersed ourselves in such data, the experience has served us well in generating ideas for test tasks, in refining them, and in selecting those which would be truest to the process as we are able to comprehend it from the experiences of eminent creative individuals. In addition to the biographies, autobiographies, and writings of these creative people, we have found such works as the following especially useful: Schwartz and Bishop's two-volume work, Moments of Discovery (1958); Rossman's The Psychology of the Inventor (1931); Taton's Reason and Chance in Scientific Discovery (1957); and Goertzel and Goertzel's Cradles of Eminence (1962).

In trying to keep the measures we were developing true to the process as we understand it, a number of issues have been identified and handled with varying degrees of success. We have become increasingly aware of the need for a greater range of tasks, the involvement of a greater diversity of stimuli and of a larger number of the senses, and expanding the limits of the kinds of observations made of performance. We have also given attention to such task dimensions as: sex, age, and cultural appropriateness; familiarity-strangeness; fantasy-reality; and complexity. Let us examine now some of these issues and the approaches we have used in trying to develop more adequate instruments.

Issues in Measuring Creative Behavior

Range and Complexity of Tasks

In our work we have tended in the direction of fairly complex tasks which have features which make use of what we know about the nature of the creative thinking processes, the qualities of creative products, the creative personality, and environmental conditions which facilitate or inhibit creative behavior. Very early in our experience, we began to include both verbal and non-verbal tasks. We have continued to increase our repertoire of non-verbal tasks, although most of them are still of the figural type. To the Circles Task, we have added Squares and Parallel Lines, various versions of the Incomplete Figures Test, the Picture Construction or Shape Test, a Manipulative Design Test, and the Science-Toy Test.

The verbal tasks have involved a variety of objects and materials which stimulate the senses of sight, hearing, and touch. The Ask-and-Guess Test calls for questions about gaps in knowledge about the events occurring in a picture, and hypotheses about possible causes and consequences of the pictured events. Similar uses have been made of excerpts from films. In the Product Improvement Test, objects are usually presented for examination. We have adapted the concept of the well-known Consequences Test by presenting new improbable situations along with drawings for what is called the Just Suppose Test. The Sounds and Images Test makes use of tape-recorded sound effects, a progressive series of warm-ups, and other built-in features based on research findings. We are now developing tests based on tape-recorded dramatized events, using both fantasy and reality materials. As an example of the former, we are using the story of Giovanni and the Giant. Each time the Giant maneuvers Giovanni into a tight spot, we stop the tape for pupils to write their solutions. We are using "Polar Pilot," the story of Richard E. Byrd, in a similar manner.

From our experiences, it seems clear that some persons respond more creatively to things which they hear, while others achieve greater heights in response to visual stimuli. Some individuals are free, spontaneous and bold in their thinking when permitted to express their ideas in non-verbal forms, but are tremendously impoverished or even paralyzed if they have to communicate their ideas in words. For others, the reverse is true. This is one of the reasons why we do not in the experiments presented in this volume expect to find ways of facilitating creative thinking which will be effective for all persons. Our question will be, "Is this procedure more effective than another with most persons?" Later, we can ask, "What kinds of persons respond to what kinds of procedures?"

Task-Structure and Time-Limits

The nature of a test task can be changed by altering the set or expectations of the subject, the nature and extent of the warm-up process and the motivation, the timing, and other features. To obtain a maximum of information from a minimum of testing time, one of the really important methodological problems in this area of measurement, we at times make a deliberate effort to combine into a series of tasks a continuum along some of these variables. Reactions to time pressures are so varied that this at times results in low intercorrelations among the scores derived from a series of tasks so arranged. A three-task, non-verbal battery provides a good example. The first task, Picture Construction, is designed to stimulate originality and elaboration. The ten-minute time-limit is more than most children or adults will use. The high elaborators, however, do not have enough time and some of the highly fluent individuals keep thinking of additional ideas or they change completely their first idea. The two succeeding tasks (Incomplete Figures and Circles) increasingly elicit greater variability in fluency, flexibility, originality, and elaboration. There is not enough time to complete all of the possible units and make them elaborate. Thus, it should not be surprising in the chapters which follow if we find that some evaluative condition does not bring consistent results when these three types of tasks are used.

Task Complexity Variables

The complexity of the three tasks described above is varied through the instructions. In the first task, the primary motivation is for originality first and for elaboration secondarily. In the second task, flexibility or variety of type of response is added to originality and elaboration and fluency is a minor consideration. In the third task, fluency enters to compete with originality, elaboration, and flexibility. In the product improvement task, some preliminary exploration has been conducted with variations in the quality and elaborateness of the product from a forty-nine cent model of a toy purchased in a dime store to a forty dollar Steiff model imported from Germany. The familiarity-strangeness continuum has also been varied, with toys ranging from the universally familiar toy dog to the relatively rare, in our culture, toy kangaroo.

The complexity variable is a major feature of Sounds and Images. The first sound effect is a relatively familiar and conceptually simple one, such as a thunderstorm. The sound effects become increasingly more unfamiliar and complex. The final sound effect involves six relatively strange and unrelated sounds, placing quite a demand upon the subject's ability to synthesize diverse elements into some unified image. The series of sounds are repeated a second and a third time, however, decreasing the familiarity variable in one aspect.

Task Appropriateness

Since we have been interested in developing tasks which can be used from kindergarten through graduate school, with both sexes, and in diverse cultures, the matter of task appropriateness has been quite important. This does not mean that we should avoid entirely tasks which are inappropriate at some age, to one sex, or in some specific culture. Indeed we have learned much about the way nature and culture have contrived to blot out certain areas of awareness and made them taboo for certain individuals or groups. Many highly creative individuals seem to be able to transcend these taboos and maintain their openness.

The Fantasy-Reality Dimension

Our interest in maximum "universality" of tasks has influenced our interest in the fantasy-reality dimension of a test task. We have the general impression that fantasy situations produce better results with all ages than do reality tasks and are fairer to all groups than most reality situations would be. Of course, problems like Guilford's "taking-a-bath" item are rather universal. But "taking a bath" obviously creates different problems for different ages, sexes, cultures, and conditions of life. We learn a great deal from using problems with well-defined biases, but it is doubtful that they give us the best measure of creative potential.

Individual, Oral versus Group, Written Administration

The issues surrounding individual, oral administration versus group, written administration continue to bother us, especially with tasks requiring multiple verbal responses. Although this problem is more serious in testing children, there are tremendous individual differences even among graduate students in ability to write down one's ideas. At the fourth-grade level, scores on group administered tests of creative thinking correlate more highly with scores on tests of intelligence and achievement than scores on individually administered tests. It is doubtful, however, that the group test is the more valid measure of creative talent.

Even at the sixth-grade level, there is almost no relationship between scores on tests of intelligence and group measures of creative thinking within the ranges of the upper 25 per cent in intelligence, but there is a relatively high relationship between these two variables within the lower 25 per cent in intelligence. These results may occur because the group test of creative thinking does not yield a valid measure of the creative thinking abilities at this level of intelligence. On the Ask-and-Guess Test, the test-retest reliabilities range from .46 to .61 in grades four through six when one test is written and the other oral, whereas the relationships range from .75 to .85 when both administrations are written, even with different stimulus pictures.

Cues, Sets, and Invitations to Regress

Whether or not to give examples as a part of the instructions is an important issue. Present indications are that the giving of examples reduces originality and increases fluency.

A similar issue pertains to emphasis upon quantity as opposed to some quality like "clever, unusual and original." In one study, instructions to give "clever, unusual and original" responses actually freed children below the fourth grade to give a larger number of responses. Although the tendency was reversed in the fourth grade and above, the differences are not statistically significant. In another study, when fluency and originality were differentially rewarded, emphasis on originality increased the originality of responses without significantly reducing the fluency.

Whether or not to provide some kind of warm-up, stimulate competition, or invite subjects to regress also constitute interesting issues. Present indications are that when these features are built into the test administration procedures, there is an increase in the creative thinking, especially in the number of original ideas. We do not know, however, what effect the introduction of these features have on validity. My own hunch is that they reduce validities where criteria involve school achievement, certain kinds of job performance, or other situations which pose a strict dichotomy between work and play. I would hazard a guess, however, that there would be an increase in the validity where criteria involve inventiveness, discovery, and the production of novel ideas.

Time Limits and Test Length

We are experimenting with different time limits for the same tasks. We have been tempted even to give untimed or take-home tests. When time limits have been doubled experimentally, fluency has been greater per unit of time during the usual time-limit than during the extended time-period. The reverse has been true of originality. We are interested not only in differences in scores on such factors as fluency, flexibility, originality, and elaboration, but also in determining what time limit produces what type of validity. A similar issue is involved in determining the most desirable length of a battery or tasks to be administered at a single sitting. With batteries of about one hour in length, many individuals reduce both the quantity and quality of their production near the end, while others maintain about the same pace throughout. Knowing this, we must ask, "Does performance on the first tasks yield a better index of potentiality than does performance on the same battery administered at two or three different sittings?" Perhaps a better question would be, "What kinds of potentiality does each condition enable us to identify?"

Testing Conditions

Although we know that stress increases variability and that beyond a certain point stress affects adversely almost any kind of intellectual performance, we keep having to learn this lesson anew in our efforts to measure the creative thinking abilities. In two exceptionally promising experiments designed to develop creative thinking skills, we have obtained negative results for this reason. On one occasion, the post-test was conducted on what turned out to be the hottest day in that part of the country in over five years. The struggle to think creatively was painfully obvious and it was no surprise that the test scores were significantly lower than those attained on the pre-test. (Ordinarily, even control groups show gains, sometimes significant ones.) There is little doubt that psychological stresses can have similar detrimental effects. This does not mean that the introduction of stressful testing conditions might not increase the validity for certain kinds of creative performance. Workers should be aware of the effects of various kinds of testing conditions, however, and interpret their data accordingly.

Scoring Problems

We have constantly experimented with different schemes for scoring responses obtained to the tasks which have been developed. At first we were inclined to score the responses to a single task in as many ways as we could think of, including not only such qualities as fluency, flexibility, originality, and elaboration, but also communication, inventive level, constructiveness, penetration, resistance to closure, synthesis and the like. We knew that such elaborate scoring would be prohibitive in a practical situation but felt that we must go through this phase of elaborate scoring to determine what kind of scoring would produce the best "pay off." The scoring task became so overwhelming, however, that we had to abandon most of this plan before we obtained our answer. Next, we went in the direction of simplification and systematization. This increased the speed and interscorer reliability of scoring on most of the tasks, but resulted in such high interscore coefficients of correlations that the subscores for fluency, flexibility, originality, and elaboration lost much of their meaning. Validity also seemed to suffer somewhat. Thus, we are now using a somewhat more detailed but reasonably objective and systematic system, as illustrated in our present manuals. We are now experimenting with different methods of adjusting flexibility, originality, and elaboration scores by correcting for fluency. Otherwise, we continue to have such high correlations among the fluency, flexibility, originality, and elaboration scores of a single task that some of their true meaning may be lost.

Reliability and Validity

In passing, some evidences have been cited concerning the reliability and validity of the measures used in this series of studies. Since reliability and validity must be determined anew for each instrument, however, it seems desirable to postpone the discussion of problems in these areas and the presentation of data concerning them until the next chapter.

Chapter 4

INSTRUMENTS USED IN STUDYING THE ROLE OF EVALUATION

In developing instruments and data gathering devices to test hypotheses concerning the role of evaluation in creative thinking, we have tried to make the best possible use of what is known about creativity -- the creative process, the creative person, the creative product, and the presses which facilitate creative functioning. We have relied upon the historical accounts of creative achievement, studies of the lives of creative persons, laboratory and field studies designed to affect creative functioning, studies involving the evaluation of creative products and processes, efforts to measure various aspects of man's mental functioning, and the like. We have used these sources in generating ideas and in testing them theoretically to make certain that the instruments developed would have as good face validity as possible.

Ideas Behind Test Tasks

As indicated in the previous chapter, we have also gone as far as time and resources will permit in demonstrating objectively that these instruments have validity and reliability. In this chapter, we hope to show as not altogether true the charges of some critics that studies of creative behavior are being made with instruments which have validity only in the minds of their creators. It may be true that criteria of creative behavior are elusive, but we decided at the outset to define creative thinking as adequately as we could and then to try to remain true to this definition. We believed that if we could do this, we could afford to ignore some of the hopeless bickering about the meaning of creative behavior. I had observed similar rather futile discussions about the meaning of personality and knew how futile such discussions can be. I did not feel that we could afford to waste time on such matters.

In seeking to assemble objective evidence of the validity of the instruments which have been developed for the study of creative behavior we have considered a wide range of indicators. In considering the creative thinking abilities, we have been concerned about those mental abilities which appear to be involved in the creative process and in producing creative ideas of any kind. For example, some of the ideas which we score in determining ideational fluency are certainly not very creative. We continue to derive a fluency score in this manner because we believe that the evidence indicates that the person who is able to produce a large number of ideas is more likely to think creatively than the person who is unable to do so. Certainly, this ability to produce a large number of ideas has characterized many of our eminent creative persons. For example, one of Edison's staff members once remarked, "Edison can think of more ways of doing a thing than any man I ever saw or heard of. He tries everything and never lets up, even though failure is apparently staring him in the face. He only stops when he simply can't go any further on that particular line" (Meadowcroft, 1949, p. 219). This statement implies that Edison was also flexible, that he tried many approaches and abandoned an approach when it no longer seemed to offer promise. Thus, we have continued to obtain a flexibility score to show the number of different approaches or the variety of ideas produced. It is true that some of these approaches are not in themselves creative, but we believe that it indicates the presence of an ability which is important in creative functioning.

In a similar manner, we have continued to try to refine our measures of originality, believing that such a quality comes close to the essence of creative thinking. Certainly there is rather good agreement that creative behavior involves the production of something that is novel or at least statistically infrequent. Even in devising our scoring guide for determining originality scores we have given recognition to the fact that more than statistical infrequency is necessary to make a response original. We have required that it be to some extent adaptive to reality. We have relied rather heavily upon empirical signs of novelty in terms of the statistical infrequency of the responses among members of culturally relatively homogeneous groups. We believe that this is justified because it gives us, as Guilford (1962) maintains, "some workable operations for applying the criterion of unusualness." The index of unusualness can, therefore, be objective.

In the same way, the various indices of elaboration which we have developed are objective. Their determination involves only the counting of the number of different ideas used in elaborating a basic idea or plan. This does not mean that every idea counted in determining the elaboration index is creative or even original. In fact, some of our measures of originality on a particular test may have a negative correlation with the measure of elaboration on the same test. We believe that the ability to elaborate an idea is a valuable one. The successful creative person must sustain his original insight, elaborate upon it, and develop it to the full. Thus, we believe that the person who is able to elaborate to a high degree the ideas he produces will have a better chance of making creative achievements than the person who is unable to do so.

Strategy in Selecting and Validating Test Ideas

One strategy that we have used constantly is to generate ideas for test tasks and for scoring them from descriptions of the creative process, the behavior of creative men and women in achieving their breakthroughs, and the like. We then identify children as high or low in these measures and see if the same characteristics differentiate these persons as differentiate eminent creative persons and appropriate comparison groups of less creative persons. For example, MacKinnon (1962) reports that the creative persons studied by him and his associates have strong self-images or self concepts, are both more sensitive and more independent than their peers, make more unconventional responses, have considerable sense of humor, and the like. Thus, it was not without significance when Weisberg and Springer (1961) found that fourth-grade children identified as highly creative by one of the instruments used in the present series of studies differed in similar ways from their less creative peers. Thus, in searching to test the validity of instruments it is necessary to go back and forth between a variety of kinds of data. Certainly, it is possible that we could be deceived by the presumed similarity between certain characteristics of the thinking of children and that of people who have made outstanding creative achievements. We believe, however, that we can reduce the extent to which we deceive ourselves by this constant going back and forth from data to instrument and from instrument to data, checking and rechecking our "anchors in reality."

In this chapter, I shall describe the key instruments used in the present series of studies. Where I have not already done so in the first three chapters, I shall set forth the main ideas behind each instrument and present what I consider to be some of the more important objective evidences of reliability and validity.

Test of Imagination -- Form D

The basic test of creative thinking ability used in most of the studies in the present series is Test of Imagination (Form D). Its evolution and the basic ideas behind it have been described in the preceding chapter. The tasks, the instructions for administration, and the available reliability and validity evidence will be presented in this section.

Materials

The materials required for the individual administration of this test include: a test booklet for each subject, a stop watch, a stuffed toy dog (monkey, giraffe, etc. in alternate forms), and a print of Tom, the Piper's Son. For the group administration, it is desirable to have colored slides of the toy dog and the picture which are projected on a screen. It is still advantageous to have available for display a model of the toy dog and a copy of the print. This feature is not necessary, however.

Orientation to the Test

An attempt should be made to orient the introduction to the specific group being tested. In general, the orientation to groups usually went something like the following:

> "The tasks which you will be doing this hour are called tests of imagination. They may also be called tests of your creative thinking ability, your ability to think up ideas. We are finding that this kind of ability is more important in school success and in life than we used to think. We have given these tasks to college students, people in different occupations, elementary school pupils, high school students, and others. Most of them have enjoyed doing these tasks and we hope that you will. We also hope that you will do your very best during this next hour to show how well you can use your imagination. There are no "right" or "wrong" answers, but we do want you to give the most imaginative, inventive, and clever ideas you can think of. You will be given several tasks and timed on each. Use your time well and work as rapidly as you can with comfort.
>
> "Now, will you write your name on the face sheet of your booklet, then the date, and your grade."

Testing Instructions

"Now, I am going to show you a little stuffed toy dog. On the first sheet of your test booklet, I want you to list the most interesting, cleverest, and most unusual ways you can think of for changing the toy dog so that children would have more fun playing with it. You will have eight minutes to write down as many ideas as you can think of."

Time: Eight minutes after instructions have been completed.

"Your time is up on this part. As soon as you have finished the sentence you are writing, go ahead to Part II. List here the most interesting, cleverest, and unusual uses you can think of for this toy dog other than as a plaything. These may be uses of it as the toy now is or as it might be changed. For example, it could be used just as it is for a pin cushion. Or, it could be made two or three feet tall and a child could sit on it or ride it. All right, go ahead and work as rapidly as you can for the next five minutes."

Time: Five minutes after completion of instructions.

"All right, your time is up. As soon as you have finished the sentence you are writing, go ahead to Part III. List on this page the most unusual, interesting, and clever ideas you can think of for using tin cans. The cans can be of any size and shape and you can use as many cans as you like. You will have five minutes. Go ahead."

Time: Five minutes after completion of instructions.

"Your time is up. As soon as you have finished writing the idea you are on, go ahead to Part IV. In the next ten minutes, see how many objects you can sketch which have a circle as the main part. Just use a few lines on the circles below to identify your ideas which might start: wheel, tire, steering wheel, etc. Your lines might be either inside or outside the circle, or both inside and outside. (Demonstrate on blackboard.) If you don't think we'll be able to guess what object you have sketched, label it. All right, go ahead."

Time: Ten minutes after completion of instructions. In individual administration and in testing children in the primary grades, it is necessary for the examiner and his assistants to have the subjects identify the objects they have sketched.

"The remainder of our tasks is what we call the Ask-and-Guess Test. We consider what you do on this part an indication of how well you can use your curiosity about the world in which you live and how good you are at guessing possible causes and consequences of various events. You will be shown a picture and asked to use your imagination about what you see."

"On the next sheet, write down all of the questions you can think of about the things you see in the picture. Ask questions about any or all parts of the picture and of the events occurring in it. Ask only questions which you cannot answer just by looking at the picture. For example, don't ask, 'Is the grass green?' If you are not color blind, you can tell this by looking at the picture. All right, work as rapidly as you can for the next five minutes.

Time: Five minutes after completion of instructions.

"All right, your time is up. Turn to the next page as soon as you have finished the question you are writing. In the spaces on this page, list as many possible things as you can think of which might have caused or led up to the action shown in the picture. Make as many guesses as you can of possible causes in the next five minutes. Go ahead."

Time: Five minutes after completion of instructions.

"Your time is up. We now come to the last part of the test. On the last page, list as many possibilities as you can of what might happen in the situation pictured. Think of both immediate and long-range consequences. What is going to follow the action shown in the picture? Make as many guesses as you can think of. Work as hard as you can for the next five minutes."

Time: Five minutes after completion of instructions.

"Your time is up. Now pass your booklets to the aisle. We appreciate your hard work and hope that you enjoyed it. I am sure that we shall learn a great deal from these materials about the way people think."

Scoring

The first four tasks (Product Improvement, Product Utilization, Unusual Uses of Tin Cans, and Circles) were scored for fluency, flexibility, and originality. The Ask-and-Guess Test was scored only for fluency and adequacy of response.

In all cases, fluency was determined by counting the number of appropriate or relevant responses given by the subject. Responses reflecting a lack of adaptation of some degree to reality are not counted. For example, responses requiring that the dog be alive are not counted as bona fide responses. The reality requirement is that the resulting product be a toy which would be fun to play with.

Flexibility in all cases was determined by counting the number of different categories into which responses can be classified. For each task, a scoring guide consisting of an alphabetical list of categories was used. The flexibility categories for the Product Improvement Test are the ones adapted from Osborn's (1957) work: adaptation, addition, changing color, changing shape, combination, division, magnification, minification, motion, multiplication, position, quality of material, rearrangement, reversal, sensory appeal (ear, touch, eye, smell), substitution, and subtraction.

The following are examples of the categories used in scoring the Product Utilization Test: bathroom uses, bedroom uses, business and industrial uses, decorative uses, dining or eating uses, library uses, living room uses, etc. Examples of the categories for Unusual Uses of Tin Cans are: animal waterer or feeder, apparel, art, bank, cage, construction, container, communication, cooking utensils, etc. The following are illustrative of the categories used in scoring the Circles Test: animal faces, animal parts, animals, audio-visual equipment, balls, buildings, building parts, candy, clocks and watches, coins/money, containers, etc.

The scoring guides for determining the originality index were based on actual tabulations of responses given by subjects covering a broad education span. Approximately 500 records were used in these tabulations and a five-point scale (0, 1, 2, 3, 4) based on the statistical infrequency of the response was used in assigning weights. A few illustrative examples are offered for each task.

Product Improvement (Toy Dog):

	Weight
Adjustable in length	4
Assemble-disassemble	3
Attach nose loosely	4
Ball to balance on his nose	4
Bark, speak	0
Bark, pull ears to make bark	4
Bark when squeezed	2
Bells on it	3
Bigger	0

Unusual Uses (Toy Dog):

Acid tester	4
Advertiser (symbol)	2
Ash tray	2
Atomizer	4
Bed decoration	0
Book ends	1

Unusual Uses of Tin Cans:

Alarm, burglar, etc.	3
Anchor (filled with concrete)	3
Animal or bird shelter	2
Animal or bird waterer or feeder	0
Apparel, hat, shoe, etc.	1
Armour	1
Art materials or objects	1
Ash tray	0
Balancing games	2

Circles Test:

Aquarium, aquarium with fish	3
Apple	1
Balloons	0
Balls	0
Basketball net hoop	1
Baskets	1
Bell and buzzer	2
Bicycle	2

In the studies reported herein, the Ask-and-Guess Test was not scored for flexibility and originality. Instead, it was scored for adequacy or quality. The general rule for scoring the adequacy of a question is: Could the question be answered by looking at the picture? If the question cannot be answered by looking at the picture, the response is scored as adequate. For example, an inadequate question about the Tom Piper picture would be: "Is the farmer carrying a pitch fork in his hand?" If the subject asked, "Would the farmer really stick the pitch fork in Tom?" he would be credited with an adequate response. The question cannot be answered by looking at the picture. Furthermore, it is a thought-provoking question.

In judging the adequacy of the hypotheses about causation, responses were scored as adequate if they reflect "universal, abstract, necessary causes." Sequences of events of the "this-is-the-way-it-happened" type were not scored as adequate. In the Tom Piper problem, a response such as "Tom and/or his family were hungry or starving," would be judged as adequate. A series of statements such as the following would not be judged as adequate: "Tom ate his breakfast and then he went to school. At recess, he played with Mary and Bill, etc."

The rules for scoring adequacy of consequences are essentially the same as those for scoring causes. The consequence must follow as a logical outcome of the behavior in the picture to be considered adequate. In scoring sequential stories, each action in the story is scored as a separate response and given one point, if it indicates a genuine cause and effect relationship. If the first response in a series is not a logical consequence of the pictured event, the first response is not counted but succeeding responses are considered adequate if they follow as logical consequences of the others.

The percentage of adequate responses given by a subject seems to be of special significance. In a factor analysis, the percentage of adequate responses clustered with being chosen in response to the sociometric question, "Who in your class thinks of a lot of good ideas?" This suggests, quite interestingly, that children keep a kind of batting average on one another and that this batting average determines their perception of who "thinks of a lot of good answers." It is not the number of good ideas produced but "how much of the time they are right."

Although the scoring concept of elaboration was developed in the course of the studies described herein and used in some of the specific studies involving non-verbal, figural tasks, it was not applied to the tasks included in Form D until quite recently.

Interscorer Reliability

Throughout the history of this series of studies, we have experienced little difficulty in maintaining interscorer reliabilities in excess of .90. Yamamoto (1962), for example, reports the following coefficients of interscorer reliability based upon 64 test records scored by two independent scorers:

Product Improvement:	Fluency	1.00
	Flexibility	.87
	Originality	.98

Unusual Uses (Toy Dog):	Fluency	1.00
	Flexibility	.84
	Originality	.92
Unusual Uses (Tin Cans):	Fluency	1.00
	Flexibility	.87
	Originality	.98
Circles:	Fluency	1.00
	Flexibility	.91
	Originality	.98
Ask-and-Guess Test:	Fluency	1.00
	Adequacy	.96

In order to maintain quality control, occasional interscorer reliability checks are made on each scorer.

Test-Retest Reliability

Both as a battery and as separate tests, Form D has undergone a variety of test-retest reliability studies. With a sample of 85 student teachers and a time interval of approximately 10 weeks between tests, Goralski (1962) obtained coefficients of reliability of .82, .78, .59, and .83 on fluency, flexibility, originality, and battery total. Eherts (1961) reported a test-retest reliability coefficient of .88 for 29 fifth-grade pupils with an elapsed time of seven months between the two testings. Sommers (1961) reports reliabilities of .97 and .80 for two different samples of college students each about ten weeks apart. With an elapsed time of two weeks, I obtained a test-retest reliability of .79 with a summer camp population involving subjects ranging from the fourth through ninth grades. The post-testing was conducted under extremely adverse conditions including extremely hot weather (the warmest experienced in the area in over five years). Testing samples of 100 to 150 children in each grade from grades two through five, first in the fall and again in the spring, Wodtke (1963) reports reliability coefficients ranging from .34 to .79.

In a number of studies, test-retest reliabilities have been obtained for separate tasks. Mackler (1962), using three testings and three alternate forms, each separated by a two-week interval, obtained reliabilities of .82 (first and second testings), .89 (second and third testings), and .84 (first and third testings) for the fluency score of the Ask-and-Guess Test. Reliabilities of .79, .73, and .68 were obtained for the adequacy scores. With 100 ninth-grade students, McGreevey (1961) obtained alternate-form reliability coefficients of .79 and .76 on the Ask-and-Guess Test at a single testing. Yamamoto (1962a) obtained test-retest reliability coefficients of .83 and .78 on the Ask-and-Guess Test for 22 college seniors with an interval of approximately 10 weeks between testings.

Mackler (1962), using the same design with the Unusual Uses Test as he used with the Ask-and-Guess Test (three testings, each two weeks apart), obtained reliabilities of .61, .62, and .71 for fluency, flexibility, and originality between the first and second testings; .75, .74, and .66 between the second and third testings; and .65, .71, and .60 between the first and third testings. Yamamoto (1962a) obtained reliabilities of .75, .60, and .64 for Unusual Uses of Tin Cans and reliabilities of .85, .69, and .77 for Unusual Uses of the Toy Dog/Monkey in the same situation described above.

Yamamoto (1962) also obtained reliabilities of .69, .64, and .61 on the Product Improvement Test using the toy dog in one case and the toy monkey in another. Rouse (1963), using the Product Improvement Test with 31 mentally retarded youngsters with an elapsed interval of about six months, obtained reliabilities of .85, .76, and .68.

The Circles Test has also been subjected to several test-retest reliability studies. Mackler (1962), in the triple testing situation already outlined, obtained reliabilities of .72, .60, and .63 for fluency, flexibility, and originality between the first and second testings; .65, .62, and .81 between the second and third testings; and .47, .60, and .57 between the first and third testings. Yamamoto (1962), in the situation already specified, obtained reliabilities of .76, .63, and .79. Grover (1963), testing and retesting 101 ninth-grade subjects after an interval of one week, obtained a reliability of .69 on the Circles Test.

Validity

Two General Approaches

As already indicated in the previous chapter, a deliberate attempt was made in designing tasks, working out instructions for test administration, and developing scoring systems, to build into Form D characteristics which make the best use of what we know about creative behavior. Our general strategy in attempting to establish objective evidences of validity has involved one or the other of the following approaches:

1. Identifying high and low groups on some test measure and then determining whether or not they can be differentiated in terms of behavior which can be regarded as "creative" or personality characteristics which differentiate highly creative persons from their less creative peers.
2. Identifying criterion groups on some behavior accepted as creative and then determining whether or not they can be differentiated by test scores.

Observations of Behavior

Using the first approach, we formed models of heterogeneous groups on the basis of total scores on Form D and placed them in situations where their behavior could be observed systematically. For example, in a class of 25 pupils, the five most creative pupils as identified by this measure were each placed in a different group. Then, the next most creative pupils were each assigned to one of these groups, and so on until all pupils had been so assigned. They were then assigned the task of determining, demonstrating, and explaining the uses, intended and unintended, of a box of science toys. In spite of obvious and sometimes strong social pressures to reduce the productivity of the most creative member of the group, in 17 of the 25 groups (68 per cent) the most creative members succeeded in initiating the largest number of ideas during the exploratory phase of the activity. In several other cases, the most creative member initiated only one idea less than the top contender. As a group, they initiated far more ideas than their less creative peers (significant at less than the .01 level of significance). The observed strategies of the most creative members of these five-person groups in adapting to the pressures of the group were also the same as those generally attributed to creative adults in coping with social pressures in daily life: counteraggressiveness, apparent ignoring of criticism indomitable persistence in response to frustration, compliance with group demands, clowning, silence and apathy or preoccupation, inconsistent performance, filling the gaps when others falter, and solitary activity of an exploratory and experimental nature.

Personality Studies of High Scorers

When matched for intelligence, sex, race, and teacher, the most creative boy and the most creative girl in 46 classes from grades one through six proved far more frequently than their controls to have reputations for having wild and fantastic ideas, to produce drawings and other products judged as "off the beaten track," and work characterized by humor, playfulness, relative lack of rigidity, and relaxation.

Using most of the tasks contained in Form D (Ask-and-Guess Test, Circles, and Unusual Uses of Tin Cans), Weisberg and Springer (1961) tested a sample of 32 gifted (high IQ) fourth-grade children. They made careful personality studies of each of these children and conducted psychiatric interviews with their parents and compared the most creative children in the sample with the least creative. Through psychiatric interviews, the highly creative children were rated significantly higher on strength of self-image, ease of early recall of life experiences, humor, availability of Oedipal anxiety, and uneven ego development. On the Rorschach Ink Blot Test, they showed a tendency toward unconventional responses, unreal percepts, and fanciful and imaginative treatment of the blots. Their Rorschach responses also described them as being both more sensitive and more independent than their less creative peers.

Contrasting Groups (High IQ vs. High Creative)

Through numerous partial replications of the Getzels and Jackson (1962) studies, it has also become clear that tests of creative thinking and tests of intelligence identify different types of gifted individuals. The ways in which they are different describe those high on the measures of creative thinking in ways which might generally be regarded as "creative." They are perceived by their teachers as less desirable pupils, as more difficult to get to know, as more playful and less hardworking. They choose occupations which are regarded as unconventional or rare.

Negative Correlations with Rigidity Measures

Fleming and Weintraub (1962), using essentially the same tasks as are included in Form D, found a coefficient of correlation of -0.41 (significant at the .01 level of confidence) between attitudinal rigidity measured on the Frenkel-Brunswik Revised California Inventory and scores obtained on the creative thinking test battery. The attitudinal rigidity score also correlated -.37, -.40, and -.32 with the originality, fluency, and flexibility scores, respectively. Their subjects were 68 gifted elementary school children in grades three through six.

Language Characteristics

In a pilot study to test a new computer program for analyzing language behavior, Vincent Johnson of our staff differentiated high and low groups of children on the Circles Test and studied their language behavior as manifested in imaginative stories. The more creative children wrote longer stories, used a greater number of different words, more frequently used first person pronouns and other words indicating personal involvement, and more conjunctions indicating cause and consequences. Yamamoto (1963) obtained coefficients of correlation of .49 and .51 for the fifth and sixth grades respectively between composite scores on Form D and a measure of originality based on imaginative stories.

Classroom Behavior of Teachers

In two as yet unreported studies (Hansen and Blockhus), a group of six high scoring general business teachers were compared with an equal number of their less creative peers on the basis of intensive observations of classroom behavior and studies of pupils growth. The more creative teachers behaved in ways which were dramatically different from their less creative peers. They asked more questions, asked a greater variety of kinds of questions, gave more illustrations of key concepts, and interacted more with their students. Their pupils also made significantly greater gains in originality on the product improvement, unusual uses of tin cans, consequences, and problem situations.

Teacher and Peer Nominations

Using the approach of identifying criterion groups regarded as "highly creative" or "non-creative" on the basis of some independent criterion, several encouraging bits of validity evidence have been accumulated.

As immediate criteria, we have frequently used teacher and peer nominations on various criteria of creative thinking, curiosity, and the like. Quite uniformly we have found that children nominated by their teachers on such criteria achieve higher scores on the tests of creative thinking than do their peers not so nominated or who are nominated as being especially low on the criterion in question. Yamamoto (1962) administered Form D to 569 fifth-grade pupils in one school system. He obtained teacher nominations on such criteria as who thinks of the most ideas, who produces the most original and unusual ideas, who is the first to find another way of meeting a problem, who does the most inventing and developing of new ideas, and who is best at thinking of all of the details involved. He used these data to provide a rough validation of the four subscores of Form D. On each criterion, he compared the scores of those nominated with those not nominated. All of the differences were clearly significant except for elaboration.

In the peer nomination studies, results have been consistenly significant above the third grade. In other words, pupils receiving a large number of peer nominations on various criteria of creative thinking achieved higher scores on the corresponding measures of creative thinking.

Sommers (1961) used Form D in a validation study which made use of faculty evaluations of industrial arts students who had been observed in courses which provide opportunities for creative achievement. The criterion groups were identified according to faculty nominations based on definitions of creativity and the creative personality. Frequency of nomination and concurrency by other instructors were used. Weightings were assigned nominations from instructors who had made observations of students enrolled in courses permitting substantial creative behavior. Results from Form D were available for ten students about which there was consensus concerning a high degree of creativity and 12 about which there was agreement concerning a lack of creativity. The creatives achieved a mean score of 237 on the battery compared with 179 by the low creatives. The difference in means is significant at less that the .05 level of significance and only one of the low creatives achieved a score as high as the mean of the high creative group.

Sales Productivity in a Department Store

Two additional studies of specially selected groups contribute to the evidence for construct validity. One of these (Wallace, 1961) involves sales production and working in "creative" versus working in "routine, non-creative" departments of a large metropolitan department store. The subjects were sixty-one middle-aged saleswomen who had been working in the department store on an average of about twelve years. According to their sales production (the dollar value of sales per hour of employment) and the amount of customer service required, these saleswomen were divided into four groups: high sales-high service, low sales-high service, high sales-low service, and low sales-low service. When these four groups were compared with each other on their scores on Form D, it was quite clear that the high sales and high service groups scored higher on the measures of creative thinking. Wallace concluded that creative thinking ability does affect sales production and that those who are required to provide a large amount of customer service are more creative than those who provide relatively little customer service. The Ask-and-Guess Test, however, was especially effective in differentiating the high and low sales group among the low customer service or more routine departments. Apparently the saleswoman who can ask good questions and make good guesses about the customer's needs sells more than the woman who is less skilled in this respect.

Emotional Disturbance and Creative Functioning

Another study (Hebeisen, 1959) was concerned with the thinking abilities of a group of 68 schizophrenic patients in a state mental hospital. These patients were regarded as partially recovered and many of them were being considered by rehabilitation services for employment following their discharge from the hospital. The battery administered was Form A, described in the preceding chapter, and thus included some of the same tasks as are included in Form D. The performance of these 68 schizophrenic patients was compared with that of a control group consisting of 100 college students. The disturbed group showed marked impoverishment of imagination and creative thinking abilities. They exhibited far more blocking or inability to respond in any way to the task demands than did the more normal subjects. Their responses were especially lacking in originality, being of an extremely obvious, commonplace, and safe nature.

Forms EP, FP, EI and FI

Forms EP and FP were designed as alternate form tests for kindergarten through third grade and Forms EI and FI were designed as alternate forms for the fourth, fifth, and sixth grades. Forms EP and FP consist of the following tasks:

Task	Form EP	Form FP
I. Picture Construction	Triangle	Jelly Bean Shape
II. Figure Completion	Set A Figures	Set B Figures
III. Closed Figures	Circles	Squares
IV. Ask-and-Guess Test	Tom Piper	Ding Dong Bell

Forms EI and FI consist of the following tasks:

Task	Form EI	Form FI
I. Figure Completion	Set A Figures	Set B Figures
II. Closed Figures	Squares	Circles
III. Product Improvement	Toy Dog	Toy Monkey
IV. Ask-and-Guess Test	Tom Piper	Ding Dong Bell

It will be noted that three of the tasks are common to all four forms, except that there are alternate forms in the Forms E and F (pre- and post-tests). It will also be noted that there is considerable overlap between these tasks and Form D. This enables us to assume some degree of validity and at the same time develop new tasks and alternate forms.

Some study has been made of the alternate forms through test-retest reliability studies. Testing a sample of 50 summer campers ranging from grades four through nine and an elapsed interval of two weeks between testings, I obtained a coefficient of correlation of .80 with the two sets of incomplete figures. With alternate forms of the Ask-and-Guess Test, I obtained a test-retest reliability coefficient of .79 with the same sample. Mackler (1962) obtained test-retest reliabilities of .82, .89, and .84 with the Ask-and-Guess Test in the triple testing situation described in the preceding section. McGreevey (1961) also using the Ask-and-Guess Test with 100 ninth-grade students obtained a reliability coefficient of .76 with alternate forms. Using alternate forms of the Product Improvement Test, Yamamoto (1962) obtained a test-retest reliability coefficient of .83. Rouse (1963) obtained test-retest reliabilities of .85, .76, and .68 for fluency, flexibility, and originality with alternate forms of the Product Improvement Test with a sample of mentally retarded children with an elapsed time of approximately six months. Thus, with the alternate-form-test-retest reliabilities ranging from .68 to .89 it seems reasonably safe to assume some validity for the alternate forms on the basis of the original validity studies with Form D.

The data on the non-verbal, figural tasks which are emphasized in the forms for kindergarten through third grade are less complete than for the verbal tasks. Using an alternate form design in administering the Circles and Squares Tests (Squares-Circles, Circles-Squares) to 31 technical college students at a single sitting, Sommers and I obtained test-retest reliability coefficients of .68, .60, .65, and .72 for fluency, flexibility, originality, and elaboration respectively. Circles and Squares cannot be considered as equivalent forms insofar as difficulty is concerned, however, as indicated by the following means for the 31 technical college students:

	Circles	Squares
Fluency	16.7	15.0
Flexibility	13.6	11.9
Originality	18.7	15.3
Elaboration	30.5	37.4

Apparently it is easier to elaborate on the Squares Test and easier to obtain high scores on fluency, flexibility, and originality on the Circles Test.

In general, I have been willing to concede that the verbal tasks of creative thinking are more likely to yield satisfactory validity evidence in most educational settings, since success and perceptions of success in most situations is so strongly influenced by a person's verbal skills. At least one study (Hart, 1962) yields encouraging evidences of validity for the three non-verbal tasks included in these forms where the verbal tasks failed to do so. Hart tested 53 senior nursing students who had been carefully rated by a school of nursing staff according to their effectiveness in the performance of nursing functions. Comparing the more effective nursing students with the less effective ones, she found that all three of the non-verbal tasks (Picture Construction, Incomplete Figures, and Circles) differentiated the less effective students from the more effective ones at less than the .05 level of confidence. Three of the factor scores (flexibility, originality, and elaboration) derived from the non-verbal tasks also differentiated these three groups at better than the .05 level of confidence. Only the fluency score failed to discriminate these two groups of nursing students at a significant level. Using a carefully developed set of teacher ratings of creative pupil characteristics, Joan Nelson (1963) obtained statistically significant differentiations between creative and uncreative criterion groups of fifth and sixth grade children on the measures of non-verbal originality and elaboration but not on fluency and flexibility. As in the nursing study, non-verbal fluency was the least differentiating of the four non-verbal measures.

Imaginative Stories: Tests of Creative Writing

Two different forms of the Imaginative Stories Test have been used, Forms A and B. On each of these forms, ten topics are given, and subjects are asked to choose one of them to write the most interesting and exciting story they can think of about that topic. Subjects are urged not to be preoccupied with their handwriting, spelling and the like. Instead, they are asked to use their energy to put as many good ideas as they can into their stories. A time limit of twenty minutes was established in the administration of the test.

The general instructions given subjects are as follows:

> "In the next twenty minutes, I would like for you to write the most interesting and exciting story you can think of about one of the topics listed below. Try to write legibly but do not worry too much about your handwriting, spelling, and the like. Instead, try to put into your story as many good ideas as you can. Choose any one of the following topics or make up a similar one of your own."

The following titles are suggested in Form A:

1. The Dog That Doesn't Bark
2. The Man Who Cries
3. The Woman Who Can But Won't Talk
4. The Cat That Doesn't Scratch
5. Miss Jones Stopped Teaching
6. The Doctor Who Became a Carpenter
7. The Rooster That Doesn't Crow
8. The Horse That Won't Run
9. The Duck That Doesn't Quack
10. The Lion That Doesn't Roar.

In Form B, the following titles were suggested:

1. The Teacher Who Doesn't Talk
2. The Hen That Crows
3. The Dog That Won't Fight
4. The Flying Monkey
5. The Boy Who Wants to Be a Nurse
6. The Girl Who Wants to Be an Engineer
7. The Cat That Likes to Swim
8. The Woman Who Swears Like a Sailor
9. The Man Who Wears Lipstick
10. The Cow That Brays Like a Donkey

It will be noted that all of the titles involve an animal or a person who possesses some divergent characteristic. This was deliberate as we were interested in some of the studies in investigating the ways in which children value divergency and how children perceive their society's pressures against divergency. As we had planned and as was demonstrated in pilot studies, the titles appealed to the interest and imagination of the children. In fact, a child almost has to create in order to produce a story about the titles given. Very few recalled stories from their experiences.

Depending upon the purposes of the investigation in which the Imaginative Stories Test was used, the results are evaluated according to different schemes. Only the two methods used in two or more different studies will be described here. It seems better to describe the others in connection with the specific study, since the methods of analysis flow so naturally from the objectives of the specific studies.

One of the more elaborate scoring schemes was developed by Kaoru Yamamoto (1961) and includes scales for the following six general criteria: (1) organization, (2) sensitivity, (3) originality, (4) imagination, (5) psychological insight, and (6) richness. Each of these six general criteria were then divided into five components. The more detailed guide provides a definition of each component and gives illustrative scoring examples. Only the definitions of the components will be given here.

I. Organization (Score One Point for the Presence of each Component)

1. Balance (Integration). Is the production well balanced in its organization? Is it well integrated in that all of the parts contribute something to the story?

2. Arrangement (Order). Is the production skillfully arranged in terms of its temporal and/or special sequence? Here score one point whenever the author reports events in the order in which they would be expected to occur. If the production is very short (arbitrarily, less than fifty words), score zero on this dimension. A production need not be well balanced to rate high here.

3. Consistency. Is the production consistent in its efforts to give a story about one of the topics presented? Here score zero only in those cases where there is explicit contradiction or inconsistency in any part or parts of the production.

4. Conciseness. Is the production wordy or parsimonious? It is not the length of the production itself which is to be considered but rather its length in relation to its meaningfulness -- how much it says.

5. Clarity (Communication). Does the production clearly convey the writer's idea? Is the communication good? If you understand what the author is trying to say, score one point here.

II. Sensitivity (Score One Point for the Presence of Each Component)

1. Stimulus Perception. Is the subject sensitive to the original stimulus, namely, the presented title? Did he grasp what is required of him? Here also pay attention to the way the subjects responded to the verb(s) used in the suggested topic. Remember that the dog is a dog. That does not bark, not a dog that will not bark or cannot bark. The woman is a woman who can but won't talk, not a woman who simply cannot talk. When the subject ignores or overlooks this subtle but important phase, give him a zero score.

2. Association. Did the subject react adequately to the stimuli which came up in his own production? Did he permit one thing to lead naturally to another? Was his association smooth and relevant? Usually, score one point unless the production is unusually queer or incoherent in its association.

3. Relevancy of Ideas. Is the idea presented relevant? Are the ideas contributing something to the overall production? Are they essential? Are they marginal, peripheral, or totally irrelevant, or are they central? If most of the presented ideas are relevant, score one here.

4. Specificity. Is the production specific in its important details? Is it detailed in its exposition of the central ideas?

5. Empathy. Does the subject show some empathy with the principal character in his production? Score one here whenever there is explicit description of how the character feels or felt (e.g., "He was very sad,"

"She was afraid of..."). When some emotion or feeling is explicitly ascribed to a character in the story, or when the character, in direct narration, expresses his emotion, a score of one is given.

III. Originality (Score One Point for the Presence of Each Component)

1. Choice of Topic. Scoring of this criterion is entirely dependent upon the frequency of each topic chosen out of the ten possible choices (based on a sample of 1,061 subjects in the third through sixth grades). In Form A, the most common titles for boys are numbers 1, 2, 6, 8, and 10 and the use of any of these titles is scored zero. The most common titles used by girls are: 1, 2, 3, 5, 8, and 10. In Form B, the most common titles for boys are: 1, 3, 4, 7, 8, and 9. The most commonly used by girls are: 1, 4, 7, and 9. The remaining topics and self-produced topics are scored one point.

2. Ideas. Is the main idea novel or unusual? Is it stereotyped? The following recurring ideas and schemes seem to be so obvious and commonplace as to rate a score of zero and can be used as a guide until a more detailed one can be developed:

"The dog couldn't bark. He tried and tried but he couldn't bark."
"The doctor quit medicine because he didn't like it. He became a carpenter."
"The man cries because he peeled onions."
"The lion got so mad he finally roared."
"The lion could only squeak and everybody made fun of him."
"Miss Jones stopped teaching because she couldn't stand her naughty, noisy, unruly children."
"The man wears lipstick because he couldn't get it off."

3. Organization. Is the writer's way of organizing his materials governed by traditional story telling form? A score of zero should be given whenever some stereotyped form such as "Once upon a time there was ...," "...and they lived happily ever after," and "so this is the end of the story" are used in the production. (About 80 per cent of the productions of children from the third through the fifth grades use at least one of these common forms.)

4. Style of Writing. Are there any signs of an original style of writing? This dimension has no objective rationale yet and is sometimes difficult to judge. Give a score of one whenever the subject uses direct narrative sentences or quoted dialogues.

5. Sense of Humor. Is the production humorous or surprising? There could be much discussion on what constitutes humor. Granted this criterion is fairly subjective, we construe it as meaning "surprising," "pleasantly surprising," "escape from the pedestrian and trivial aspects of reality," "the juxtaposition of the incongrous."

IV. Imagination

1. Imagination. Does the subject show rich imagination or is his imaginative ability scarce and limited? Is the subject able to "associate away from" the original stimulus or is he bound to it? Score one whenever the subject develops the topic to some extent and does not appear to be "in a rut."

2. Fantasy. Is the production strictly on a factual basis or is it rich in fantasy? The question to be asked in scoring this dimension is: "Could this really happen?" A production in which animals

are talking to each other or to people is worth a score of one. It must be pointed out that there may be "imagination" without "fantasy," but by definition, "fantasy" implies "imagination."

3. Abstraction. Is the production high on the abstraction ladder? Is it attached to natural phenomena or is it logically more abstract? Give a score of one to all generalizations such as "all lions roar," or "cats don't like water." Also score one when the characters involved are named in a manner symbolic of their roles. For example, a nurse might be named "Miss Getwell" or the lion that does not roar might be named "Silence" or "Roarless."

4. Identification. Did the subject identify the principal character(s) in his story with proper name(s)?

5. Reasoning. Did the subject give any reason for the phenomenon described in the stimulus sentence or did he simply accept it as it was? In some self-developed topics this dimension may not be applicable. In such cases, give a score of zero.

V. Psychological Insight

1. Causal Explanation. Did the subject give a physical (organic) cause to explain the phenomenon described in the stimulus sentence or a non-physical (functional) reason? There is often some doubt as to whether a given reason is organic or functional. In such a case, give a score of zero.

2. Perspective. Did the subject show any perspective in terms of how and when, say "the dog that doesn't bark" would start barking again? This might be termed "restoration of equilibrium." Also score a point whenever the subject states the long-term perspective about his principal character(s), whether this "normalizes" or not. "Living happily ever after" is not enough, incidentally, unless the subject shows how this is possible.

3. Meaningfulness. Is the production meaningful as a whole? Here we are most dramatically confronted with a choice situation between social and psychological, or adult and child, criteria of creativeness, and, unfortunately, we have no clear-cut answer. Score, therefore, one point here unless the production is totally incoherent and nonsensical. The following and similar stereotypes should, however, be scored zero on this dimension:

> "Once there was a man who cried. He didn't know why. Then all of a sudden he stopped crying."
>
> "There was a lion who couldn't roar. He tried and tried but he couldn't."

4. Ego-Involvement. Is there any self-reference? Does the subject speak of his own experience?

5. Understanding. Does the production show deep understanding of the life situation described? Here the subject is judged for his insight into complex interpersonal (be it expressed in terms of animals involved) relationships. This calls for a kind of reality testing on the part of the subject.

VI. Richness

1. Expression. Literally speaking, is the production rich in its expression? Does it describe things carefully and/or colorfully?

2. Ideas. Is the subject rich in ideas? Does he have a large number of ideas? The number, rather than quality or integrity, of ideas is to be considered here.

3. Emotion. Is the production rich in its expression of emotion? Score one point here whenever the subject shows commiseration with his characters and/or his story. On the empathy dimension, we look for explicit emotion ascribed to principal characters but on emotion we are interested primarily in direct expression of the subject's own emotion. Expression of emotion might be either explicit or implicit.

4. Curiosity. Does the production show keen curiosity? Is anyone in the story chiefly concerned with finding out why, what, how, or when?

5. Fluency. Is the subject fluent in his production? Here we are interested in fluency in the sense of number of words and an arbitrary cutting score of 150 words has been established for the 20-minute time limit. As the scale is developed, it will probably be necessary to establish different cutting scores for each grade.

Reliability of Scoring

To check interscorer reliability, three judges were given the same set of 85 protocols and asked to score them independently according to the manual. All three judges were alike new to the task of rating creative writing. Interscorer reliabilities of .79, .80, and .76 were obtained.

Relationships with Other Measures

The following product-moment coefficients of correlation between the composite scores obtained from the foregoing scales and other measures of intellectual performance were obtained by Yamamoto for a class of 20 fifth graders and a class of 20 sixth graders:

Measure	Fifth Grade	Sixth Grade
Form D, Creative Thinking Ability	.56*	.28
Originality of Writing	.65*	.80*
Interest Score on Writing	.70*	.72*
Mental Age (Intelligence Test)	.27	.31
Reading Achievement (Iowa)	.60*	.38
Work-Study Skills (Iowa)	.35	.53*
Language Skills (Iowa)	.62*	.46*
Arithmetic Skills (Iowa)	.38	.47*

*Significant at the .05 level of confidence or better.

Although all of the relationships between this measure of creative writing and other measures of intellectual performance are positive and many of them are statistically significant, they are low enough to indicate that this measure is tapping a somewhat different kind of ability and/or achievement from the others, except perhaps the scales for Originality and Interest which will now be described.

Evaluation of Originality and Interest

The instructions for the writing of the imaginative stories were designed to encourage originality and interest. No ready-made scales for evaluating either of these characteristics could be located at the time the study was conducted. Thus, the relevant literature was surveyed in an attempt to determine what characteristics of compositions had been considered by others in rating them on originality and interest. These were then listed and nine characteristics for each were selected as being appropriate for relatively objective scoring. Most of the criteria for Interest were obtained from the work of Flesch and his associates (Flesch, 1948; Flesch and Lass, 1955). The others were gleaned from a variety of sources (Colvin, 1902; Hinton, 1940; Applegate, 1949).

Originality

In determining the Originality score, the following nine points or characteristics are considered and one point is given for the occurrence of each in the story.

1. Picturesqueness: Writing may be said to be picturesque if it suggests a picture, is colorful, is strikingly graphic, or is objectively descriptive.

2. Vivid: A vivid story is told with liveliness and intenseness. The description is so interesting, or even exciting, that the reader may be stirred emotionally. It is vigorous, fresh, alive, spirited, lively.

3. Flavor: A story may be said to have flavor if it possesses a noticeable, characteristic element, or taste, or appeals to the sense of taste, smell, touch, etc.

4. Personal Element: A story may be rated as having the personal element if the author involves himself in the account or expresses his personal feelings or opinions about the events described.

5. Original Solution or Ending, Surprising: What we are looking for here essentially is the "punch line." It need not be funny, though it may, but it must be unexpected, unusual, surprising.

6. Original Setting or Plot: This category is scored if the setting, plot, theme, or title is unusual or original, unconventional, new.

7. Humor: Stories are scored for humor if they have the quality of portraying the comical, the funny, the amusing. One simple criterion would be to score a story for this category if it makes the rater laugh or smile. This is not altogether dependable, however, when one is rating a large number of stories at a single sitting. Thus, it is useful to take clues from the works of some of the better known humorists: bringing together certain incongruities which arise naturally from the situation or character, frequently so as to illustrate some fundamental absurdity in human behavior or character.

8. Invented Words or Names: When parts of two or more words are combined to express some concept, when animals and persons are given amusing names or names appropriate to their character, or the like, credit is given in this category.

9. Other Unusual Twist in Style of Content: This category was added primarily for the purpose of giving a bonus credit for a high type of originality not adequately reflected in the eight foregoing categories.

Interest

1. Conversational Tone: Many children tell a story just as though they were carrying on a conversation with the reader. Others write more formally and thereby spoil the reader's interest.

2. Naturalness: Usually, but not always, stories written in a conversational tone are also "natural." The conversation, however, may be stilted and artificial; it might still be "conversational in tone" but not "natural." A story may also have naturalness without being conversational.

3. Use of Quotations: A score for "use of quotations" is given whenever the direct words of the speaker are given. Many children in the early grades (third and fourth) have not been taught to use quotation marks, although some use them without being taught. Thus, credit is given whether quotation marks are used or not. Almost all stories credited with "use of quotation marks" have a "conversational tone." Many having a "conversational tone," however, do not use quotations.

4. Variety in Kind of Sentence: Two types of variety or kind of sentence can be considered and either gives credit in this category. Sentences may vary according to use: declarative, interrogative, exclamatory, etc. They may also vary according to form: simple, compound, complex, and compound-complex. In a short story (under 150 words) any variation of either type qualifies the story for credit. In longer stories, there must be three or more variations in form and/or use.

5. Variety in Length of Sentence and Structure: If there is a mixture of short and long sentences this category is scored. Also credit is given for any variation in the structure of sentences, such as predicate before subject, dependent clause before independent clause, and the like.

6. Personal Touch: Same as "personal touch" under "Originality."

7. Humor: Same as "humor" under "Originality."

8. Questions and Answers: Two types of question-and-answer techniques are scored for this category. There may be questions and answers in the direct quotations of speakers. Or, the writer may ask the reader a question and then answer the question. Either is scored for this category.

9. Feelings of Characters: If the feelings of characters in the story are given either through their own words or through the writer, this category is credited.

Reliability of Scoring

Three judges were involved in the initial determination of interscorer reliability. The scoring task was new to all three judges, but Judge A was an established research worker with more than three years' experience in creative thinking research. Judge B had had only two months' experience with creative writing projects, while Judge C had had no training whatsoever when he was asked to perform the judging task.

The following interscorer reliabilities resulted:

Judges	No. Records	Originality	Interest
A and B	25	.88	.84
A and C	30	.84	.82

Relationship With Other Measures of Intellectual Performance

With a class of 20 fifth graders and one of 20 sixth graders the following coefficients of correlation were obtained between these two measures and other measures of intellectual performance:

	Fifth Grade		Sixth Grade	
Measure	Originality	Interest	Originality	Interest
Composite Measure of Creative Writing	.65*	.70*	.80*	.72*
Total Score on Form D, Creative Thinking Test	.49*	.53*	.51*	.45*
Mental Age (Stanford-Binet)	.44*	.29	.44*	.30
Reading Achievement (Iowa)	.63*	.58*	.26	.32
Study-Work Skills (Iowa)	.54*	.44*	.40	.41
Language Skills (Iowa)	.61*	.57*	.37	.13
Arithmetic Skills (Iowa)	.60*	.52*	.57*	.32*

* Significant at the .05 level of confidence or better.

In the fifth grade, there was a coefficient of correlation of .85 between Originality and Interest and in the sixth grade there was one of .75. Thus, it seems that the two scales are measuring many of the same variables. As in the case of the Composite Creative Writing Score, all of the coefficients are positive and many of them are statistically significant. In fact, the coefficients are in most instances higher than for the Composite Creative Writing Score, especially in regard to the measure of creative thinking provided by Form D. Yet Imaginative Stories certainly supplements, rather than duplicates, Form D whatever scores are used.

The Personal-Social Motivation Inventory

At the very outset of the Minnesota Studies of Creative Thinking undertaken by the Bureau of Educational Research, it became obvious that certain motivations facilitated or hampered the production of original or otherwise creative ideas. In both individual and group testing, it seemed that some children became productive if we employed one means of motivation (such as competition for a prize, seeing how well you can do, or just for fun) while others responded to another. This led us to a concern about the motivations which might be involved in becoming a creative person or making optimum use of one's creative talents. Since we were unable at that time (1958) to find any ready-made assessment devices, we began exploring a variety of approaches, of which the one presented here is only one.

After making an analysis of reported research on creative persons, the biographies of eminent creative persons, and the theoretical work in this area, we attempted to develop the structure for an inventory. It was planned that a scale to be called "Creative Motivation" would be the central measure. For this scale, we attempted to develop items which would show an inquiring, searching, reaching-out, and courageous attitude. Knowing that one must be sensitive to defects, problems, gaps in knowledge, and the like, we also felt that we needed a measure of "Critical Motivation." We did not want to combine these items with the "Creative Motivation" items because we know only too well that many people can recognize and identify defects but are not themselves able to produce constructive ideas and are unable to see other possibilities. Furthermore, some of them are simply not interested in going beyond the identification of defects. In fact, we were not certain that this scale would even differentiate between highly creative and less creative persons. We believed, however, that the critical motivation must be assessed in order to understand the motivations of creative people. It might provide us with useful clues in guiding individuals in the better use of their creative talents. Some individuals are unable to produce original ideas because they are too critical, while others fail to make their original ideas useful because they are not critical enough.

Another very obvious motivation of creative persons seemed to be their "Intellectual Autonomy." They are able to reach conclusions independently from their observations and other data, and have the courage to stick to their judgments. This is highly essential because the person who produces original ideas is always in the very beginning a minority of one and it takes a great deal of strength to withstand the discomfort engendered thereby. Thus, we sought to select and to construct items which would operationally define the need or motivation for "Intellectual Autonomy."

In a very provocative article by Melvin Tumin (1953), we found a very interesting theoretical rationale concerning the obstacles to creativity. These obstacles, as formulated by Tumin, include:

1. An excessive quest for certainty.
2. An excessive quest for power.
3. An excessive quest for meaning.
4. An excessive quest for social relations.
5. A pathological rejection of social relations.

Since much of the data which we had collected from the observation of children and from the analysis of the biographies of eminent creative people fitted this theoretical formulation, we undertook the task of selecting and constructing items which would operationally define each of these variables.

Many sources were used in assembling items for the eight scales identified above. The work of the Runners (1954) proved to be the most useful source of items for the "Creative Motivation" scale. Other instruments such as the Minnesota Multiphasic Personality Inventory, the Bernreuter Personality Inventory, and the like were also surveyed as sources of possible items. Others were constructed from the data we had collected from various sources about creative persons.

Exploratory Developments

The initial pool of items was judged by eight members of the staff of the Bureau of Educational Research, all of whom had been familiarized with the research concerning creative persons. On the basis of these judgments, Som Nath Ghei and I assembled a 189-item inventory with the eight scales just identified. Preliminary work seemed to indicate that the scales for Creative Motivation, Critical Motivation, and Quest for Power or Power Motivation were likely to be of the greatest value. Item analyses were then conducted to select items for a 100-item inventory which would provide scores on these three motivations (creative, critical, and power).

Evidences of Validity

Neither of the instruments can be regarded as completely validated, although the scattered bits of evidence available are quite promising and will be summarized herein.

Research Workers

The first group to which the instrument was administered consisted of research assistants and fellows and senior researchers in the College of Education at the University of Minnesota. Five of this group of 17 persons were identified as being unimaginative in their work, uninterested in educational research, each more or less working at the tasks of research to earn money to help finance graduate study. Not one member of this group attained a score in excess of 18 on the Creative Motivation scale. None of these five persons is now doing any research. None of the remaining 12 persons tested in this original group achieved a score less than 20 on this scale. All members of this group have continued to do research and have been fairly productive of professional publications, research ideas, and the like.

Graduate Students Who Produce Original Ideas

Students in Educational Psychology 159, Personality Development and Mental Hygiene, are required to develop some original idea as a part of the course requirements. These ideas are rated on five 10-point scales, as follows: (1) newness and freshness, (2) a push forward in knowledge, (3) surprisingness, (4) usefulness, and (5) creative intellectual energy expended in developing the idea. The materials to be evaluated included a statement of the student's idea, a description of the process by which the idea occurred and was developed, a rationale for the idea, a plan for testing the idea, and a statement of the possible consequences of the idea should it be found valid.

Comparisons were made between the means of those ranking in the upper 27 per cent of the class on the originality projects with those ranking in the lower 27 per cent on this criterion. The results are shown in Table 4.1. It will be noted that "Creative Motivation" scores

Table 4.1

Means, Standard Deviations and t Ratios for Measures on the Personal-Social Motivation Inventory Comparing the More Creative with the Less Creative Students as Judged by Original Projects

	High Creatives (N = 20)		Low Creatives (N = 20)			
Scale	Mean	St. Dev.	Mean	St. Dev.	t-ratio	p
Creative Motivation	20.05	3.30	17.40	4.10	2.23	<.03
Critical Motivation	6.60	2.03	7.95	2.80	1.73	<.10
Obstacles of Creativity	10.95	2.73	11.65	1.96	0.70	ns

differentiate fairly well between these two criterion groups. There is a non-significant tendency for the "Critical Motivation" score to discriminate in a negative direction. The scales developed from Tumin's formulation did not discriminate between the criterion groups but the trend was in the expected direction.

Critical and Creative Reading of Research Reports

Another requirement of the author's course in Educational Psychology 159 is to read critically one research article and to submit a report identifying defects in the statement of the problem, hypotheses, data collection, analysis of data, and interpretation of findings and to read another creatively pointing out possibilities in the statement of the problem and the like. These reports were evaluated independently by Judson A. Harmon, teaching assistant for the course, who had no knowledge of scores achieved on the Inventory. Scores on the Inventory were analyzed to determine "creative" or "critical" dominance for each student. After students were dichotomized in this way, a comparison was made of their ratings on the critical and creative reports of their reading. It was determined whether they achieved a higher score on the creative than the critical, the critical than the creative, or scored the same on both. The results as shown in Table 2 indicate that students dominated by a creative attitude tend to do a better job in reading research creatively or constructively than they do in reading research critically. The reverse is true of students dominated by a critical motivation. Results are statistically significant at the .001 level.

Table 4.2

Relative Superiority of Critical and Constructive (Creative) Research Reviews Prepared by Students Expressing Dominance of Critical and Creative Motivations on Personal-Social Motivation Inventory

	Number			
Dominant Motivation	Better on Creative	Better on Critical	Same	Total
Creative Motivation	24	3	13	40
Critical Motivation	23	29	16	68
TOTAL	47	32	29	108

Note: - Chi-square = 15.219, significant at the .001 level

Factorial Groupings

Scores achieved by 100 graduate students in Educational Psychology were factor analyzed along with scores on the need scales of the Stern Activity Index, tests of creative thinking, ratings on original projects, and various achievement measures in Educational Psychology 159. The Creative Motivation score loaded most heavily in a factor which included the following scales from the Stern Activity Index: Humanism, Counteraction, Energy, Nurturance, Understanding, Reflectiveness and Scientism. Humanism is defined by Stern (1958) as the manipulation of external social objects or artifacts through empirical analysis, reflection and discussion. Counteraction involves a restriving to overcome experienced frustration, failure and humiliation. Energy is defined as an intense, sustained vigorous effort as opposed to sluggish inertia. Nurturance involves the giving of support to others by providing love, assistance, and protection. Understanding represents an interest in intellectual activity, problem-solving, analysis or abstraction as an end in itself. Reflectiveness is defined as an introspective preoccupation with private psychological, spiritual, esthetic, or metaphysical experience. Scientism involves the need to manipulate external physical objects through empirical analysis, reflection, and discussion. Placement in this cluster of variables would seem to give some construct validity to the Creative Motivation scale, since all of the characteristics represented by these variables are commonly associated with the creative process and the creative personality.

The Critical Motivation variable is a part of a factor which includes also Quest for Absolute Certainty Pathological Rejection of Social Relations, and Excessive Quest for Social Relations. Placement in this cluster helps to identify that aspect of the Critical Motivation represented by the items in this inventory and helps to explain why scores on this scale tend to favor the relatively non-creative groups rather than the creative groups. This factor correlates .0018 with the factor in which Creative Motivation is placed.

Power Motivation is a part of a third factor which includes also the needs for Dominance, Narcissism, Achievement, and Fantasied Achievement. Stern (1958) defines dominance as an assertive manipulative control over others. Narcissism is a preoccupation with the self. Achievement is defined as a surmounting of obstacles and proving personal worth, while fantasied achievement involves daydreams of success in achieving personal recognition and narcissistic aspirations for personal distinction. Again, we have evidence of construct validity, since all of these features are involved in the rationale on which the Power Motivation scale was constructed.

Responses of Creative Leaders

At the 1962 Creative Problem-Solving Institute conducted by the Creative Education Foundation at the University of Buffalo, 39 members of the Creative Leaders Convocation were administered the short form consisting of 30 of the most promising items in the Creative Motivation scale. These creative leaders for the most part have impressive records as inventors, creative educators, creative writers, creative business men, and the like. The mean score attained by this group is significantly higher than that attained by any other group to which these items have been administered (differences significant at better than the .01 level of significance). With the exception of one item, a majority of the creative leaders answered all items correctly. In most cases the majority was overwhelming and generally much higher than in any of the other groups tested. Only 49 per cent of the creative leaders reacted positively to the statement, "My interest is often caught up in ideas that may never lead to anything." It would have been interesting to have inquired further into reactions to this item. It is likely that many of these leaders are accustomed to achieving success when they work in this way. They have confidence that such ideas will lead to something worthwhile, even though they do not know in advance what this will be.

Sex Differences in Harmony with Cultural Expectations

A peripheral kind of validity is to be found in the fact that sex differences are rather consistently in the expected direction and that most of these differences are statistically significant. In Table 4.3 which presents norms for fairly large samples of graduate students in Educational Psychology 159, it will be noted that men have higher creative motivations, critical motivations, intellectual autonomy, and need for power. Although the differences are not statistically significant, there is a trend for the women to have a stronger need for certainty, a stronger need for social relations, as well as a stronger rejection of social relations.

Table 4.3

Means and Standard Deviations of Graduate Students in Educational Psychology on the Eight Scales of the Personal-Social Motivation Inventory

	Males			Females		
Scale	Number	Means	St. Dev.	Number	Means	St. Dev.
Creative Motivation	125	18.77*	5.94	177	17.68	5.25
Critical Motivation	125	7.47*	1.86	177	6.26	1.85
Intellectual Autonomy	125	23.96*	4.43	177	22.23	5.93
Quest for Certainty	125	13.15	5.21	177	13.74	4.90
Quest for Power	125	10.42*	3.69	177	7.99	3.80
Quest for Meaning	125	6.83	1.83	177	6.63	1.83
Quest for Social Relations	125	11.55	3.70	177	12.24	3.61
Rejection of Social Relations	125	7.96	4.19	177	8.29	4.34

*Differences between males and females are significant at .01 or better.

In Table 4.4 which presents normative data for graduate students in Educational Psychology 259 on the revised form of the Personal-Social Motivation Inventory there is an even stronger difference

Table 4.4

Means and Standard Deviations of Graduate Students in Educational Psychology 259 on the Three Scales of the Revised Personal-Social Motivation Inventory

Scale	Males			Females		
	Number	Means	St. Dev.	Number	Means	St. Dev.
Creative Motivation	33	26.00	6.20	56	24.46	6.95
Critical Motivation	33	5.51	2.27	56	6.11	3.04
Power Motivation	33	13.30*	6.43	56	9.41	5.25

*Difference in means of males and females is significant at .005 level.

insofar as Power Motivation is concerned but the tendency is less marked in the case of the Creative Motivation. The tendency in regard to the Critical Motivation, however, is reversed. The women tend to be more critical in their motivations than the men, though the difference is not statistically significant. It should be noted, however, that most of the students in this group are doctoral candidates, while most of those in the other group are master's candidates. It is quite likely that women who pursue doctorates tend to have stronger critical motivations than other women.

Student Preferences in Professor-Student Relations

Another interesting bit of validity evidence comes from a study reported by Drabek (1963) involving 740 undergraduate students in a large mid-western university. Drabek identified from this sample two criterion groups according to their preference in professor-student relationships: an active group and a passive group. The 185 students scoring in the upper quartile of the Professor-Student Relations Inventory (indicating a preference for an active professor-student relationship) scored higher on the creative attitude scale (t = 2.93, significant at better than the .01 level of confidence) than the 185 students scoring in the lower quartile of this measure and indicating a preference for a passive professor-student relationship. Students preferring an active professor-student relationship were also less dogmatic, subscribed to a less orthodox religious ideology, participated more in intellectual extra-curricular activities, more frequently discussed issues of national and international importance with their parents, and more frequently used public and private libraries.

Concluding Statement

Although considerable work needs to be done in refining some of the scales and in validating the scales by systematic observation, experiments, and personality studies, it is believed that the results thus far obtained are promising enough to warrant further research.

Chapter 5

WHAT HAPPENS WHEN TEACHERS TRY TO APPLY PRINCIPLES FOR REWARDING CREATIVE THINKING[1]

The modest descriptive study described in this chapter was not a part of the original plan for this series of studies on the role of evaluation in developing creative thinking. As the study got underway, it seemed a necessary one. As we have tried to understand and to interpret the results of the originally planned studies, this study has provided much of the anchorings which give the results meaning and has been the source of generating hundreds of ideas which need to be explored, evaluated, and tested. The purpose of this chapter is to describe from the viewpoint of teachers what happens when they try to reward creative thinking. We believe it will help you to identify not only some of the important values which come from rewarding classroom creativity but also some of the difficulties and the problems a teacher encounters in rewarding creative behavior.

First, we shall try to communicate something of what rewarding creative thinking means to us. Usually, when we speak of rewarding any kind of behavior, we immediately think of rewards in terms of money or status. Although we may work for money, none of us works for money alone. Some people work for status or power, but this does not seem to be the case with highly creative people. In fact, we probably do ourselves and the creative person a disservice when we try to reward him by placing him in a position where he is boss. He would prefer to be in some other position. Yet this is a commonly used method in adult life for rewarding creative achievement. We find this phenomenon occurring as low as the fifth and sixth grades. The senior author will never forget his amazement at how it works in small groups of children. In one of our experiments designed to study the behavior of highly creative children in small groups of their less creative peers, one group of children said immediately, "Mark is our genius. I think he ought to be chairman and recorder." The task involved discovering as many uses, both intended and unintended, of *a box of science toys and explaining their principles of operation.* As chairman and recorder, the group's most creative performer was unable even to play with these toys to find out what they could do. He was made an "authority" and loaded down with responsibility and paper work.

Thus, when we use the term "rewarding creative thinking," we are not thinking of the rewards of money or power, nor even of school grades. What we have in mind might more accurately be expressed as genuine respect for the child's creative needs and abilities -- a recognition of their importance. Grozinger (1955) described what we have in mind in his book on the scribbling, drawing, and painting of children. He is trying to describe the beauty and worth of such childhood productions. He pictures the scientist, studying a fly under a powerful microscope, deeply absorbed in his contemplation of the mutations of the fly. His child, by his side, is scrawling something on the wall. Grozinger muses, "It does not occur to the scientist to accord the child that dignity which he does not deny to the fly -- the dignity of mystery. He disapproves of the child's scribbles" (p. 25).

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[1] This chapter was co-authored with R. E. Myers, now at School of Education, University of Oregon, Eugene, Oregon

The problem of rewarding creative behavior is admittedly a difficult and complex one, although it is the purpose of the study reported in this chapter to simplify it. Some may think that we have oversimplified the matter.

One serious obstacle is that it is difficult to accept as creative anything which threatens to upset the very thin balance we have achieved in our lives. Margaret Mead (1962) points out that nowhere does this difficulty show up so clearly in our society as in the classroom. She maintains that the teacher "cannot risk bringing out gifts that may disrupt the precarious balance of her overcrowded classroom." McMillan (1924) emphasized this same difficulty of space in regard to the development of the creative imagination. Imagination requires room and its free exercise gives a good deal of trouble. Young children are ardent researchers or investigators, but an investigator is very troublesome in a classroom.

Many teachers also find threatening anything other than an authority relationship with a child. Some cannot even tolerate an individual relationship with a child. The relationship must always be kept on a safe, group basis. There are many reasons why an exclusively authority relationship and an exclusively group relationship do not foster creative behavior. Mearns (1958) maintained that the "deeper rhythms of the child's mind" necessary in creative thinking were not to be disclosed except in very private interviews. He insisted that although children may chatter a great deal, they are remarkably reticent about revealing their genuine feelings. He found, however, that when he counted the confidences of children as right and respectable he learned much. Even then he rarely touched the serious stirrings of the heart and mind. He respected this side of their lives and did not probe. He insisted that whatever he learned about their thinking and feeling must be given freely, without probing.

We believe, however, that there are some things which almost all teachers can do to facilitate the creative growth of their pupils. Although every child must be regarded as unique (as well as the classroom in which he is situated), there are a number of generally accepted principles that have been supported by the experiences of outstanding teachers and by carefully conducted experiments which can be used as guides in helping children and young people realize their creative potentialities.

At this writing, there is considerable consensus among educators that there are at least a handful of truths which apply to the teaching-learning situation, whatever its character. However, doubts have been expressed frequently as to whether teachers, even when fully informed of these principles, can put them into practice under the pressures of their day-by-day interaction with children. This study represents an attempt to cast some light upon the forces at play when teachers are asked to apply deliberately a few rather widely accepted educational principles in their classrooms.

Identifying Widely Accepted Principles for Rewarding Creative Behavior

On the basis of earlier exploratory research and discussions with several groups of classroom teachers, we had been able to identify five principles which seemed to be rather widely accepted principles -- widely accepted at an intellectual level if not at an emotional level. Although many people have said that these principles are obvious -- too obvious to bother with stating -- it was apparent to me that they were not understood nor practiced by any large number of teachers. Thus, it seemed necessary to try to understand what happens when teachers try to apply them. Such information was needed in training a group of teachers to reward creative behavior in the classroom.

The following five principles were identified as widely accepted and made the focus of our initial exploration:

1. Be respectful of unusual questions.
2. Be respectful of imaginative or unusual ideas.
3. Show your pupils that their ideas have value.
4. Occasionally have pupils do something "for practice" without the threat of evaluation.
5. Tie in evaluation with causes and consequences.

Be Respectful of Unusual Questions

Nothing is more rewarding to a child who asks questions than to find the answer to his questions and to have others take his questions seriously. Questions are recognized as a reflection of a "mind hunger" and this hunger must be satisfied lest the mind be starved. Although the need must be dealt with immediately, there is much that teachers can do to enrich the period between the question and the answer. It is my belief that we should tell children only what they cannot learn for themselves. This means that we need to teach them the skills of inquiry, the skills of using questions to discover, to test, to reach conclusions. Children need to learn how to sustain a question, to play with it, toss it back and forth, refine it, and accept the questioning mood without the need for ready-made answers from the teacher or parent.

For many reasons, it is not easy for teachers to do what we generally agree that they should do. Teachers are expected to be able to give the answers immediately and many will try to do so, even when they do not know the correct answer. Furthermore, it is tension producing to delay giving the answer and in the rush of a busy schedule, giving immediate answers or ignoring questions is the easiest course. The teacher who sets out to be respectful of the questions children ask must be prepared for some shocks. Children will ask many questions which the teacher cannot answer. This should be accepted as normal and desirable, but can be tremendously threatening to the insecure teacher. Realistically, children ask questions for which there are no known answers, so why should teachers feel threatened by such questions?

A number of observers of classroom behavior have noted that few children have the power to stand up against the irritation and evasiveness of their teachers. They give up and stop questioning altogether. They receive the impression that it is bad manners to ask questions and a cause for disciplinary action. Most children want to be accepted, so they choke down their questions. Only a few rare individuals such as an Albert Einstein are willing to incur the risk of asking the questions which puzzle them. We are told that during his early school years, Einstein was frequently beaten for asking questions (Hammontree, 1959). Finally, before completing his course in the gymnasium, his science teacher asked him to withdraw from school because the questions he was asking were undermining the status of the teachers in the school. This teacher had apparently discussed the problem with the other teachers and all apparently agreed that Einstein should be asked to withdraw, except his mathematics teacher. The science teacher had kept a record of some of the questions Einstein had been asking and pointed out that no one knew the answers to these questions. Einstein, of course, later found the answer to many of these questions himself.

Thurber (1960) maintains that it is a matter of courtesy to recognize all questions that pupils raise. He admits that some questions may at first seem irrelevant or silly, but insists that if we could know all that goes on in the mind of the child, we would consider all of his questions more seriously -- in terms of our principle, we would be more respectful of all of the questions children ask. Many writers (Patri, 1931; Mead, 1962) have tried to be sympathetic and understanding of the teacher's precarious position in this matter. Mead (1962) says that the teacher is unprepared to cope with the child who uses his creativity to defeat her, the child who poses unanswerable questions which will arouse their classmates to raucous laughter. The teacher, thus, comes to distrust the upraised hand and the would-be questioner. Patri (1931) believes that the questioning child is irritating because he deters us in our smooth way, halts us and makes us turn in our tracks, and search in ways which are new to us. Questions stir up things that we would like to ignore or forget.

Be Respectful of Imaginative, Unusual Ideas

Children who are stimulated by the creative approach will see many relationships and significances that their teachers miss. They will express ideas which will shock their teachers and which their teachers will not be able to evaluate. Thus, it is extremely difficult for the teacher properly to reward such thinking and it is likely to be our more creatively gifted youngsters who suffer most from such unrewarded or even punished effort.

It is so obviously desirable that children's ideas be respected that many teachers have criticized the statement of this principle. They suggest that it should be changed to read: "Stimulate and encourage unusual or original ideas." Even after re-evaluation, it seems to me that the critical problem is not in stimulating unusual or original ideas but in learning how to respect them, how to use them when they are offered. In fact, it seems unkind to stimulate such thinking if we cannot be respectful of it. Certainly we shall not continue to elicit such thinking, if we do not respect it. Perhaps teachers need to recognize more specifically the value of these unusual and original ideas of children. They should recognize that using the ideas of children arouses interest, generates enthusiasm and stimulates effort, but that it requires concentration and thoughtfulness to attend to and evaluate the contributions of others (Verbeck, 1961). Children's ideas also provide understanding of their needs and can be used in determining how to guide their learnings. Natalie Robinson Cole (1940) has described beautifully how a child's whole attitude changes when he finds that the teacher feels he has good ideas and the ability to express them. He relaxes and his mind functions better. He is able to think.

Show Children That Their Ideas Have Value

A major difficulty in applying the principle of showing children that their ideas have value is that many teachers and other adults do not believe honestly that children are capable of producing ideas that have value. Such persons obviously will not be able to reward creative classroom behavior. Such a person might even be able to say all of the right words, but children can see through this. They will know that you do not honestly value their ideas. We would only suggest that such a person be on the alert for a while to recognize new ideas among children and to search for ways of using them and giving them value.

There is rather general consensus concerning the importance of this principle for rewarding creative behavior. Patrick (1955, p. 189) points out that all of the great thinkers of the world had to have confidence that their own ideas were more valuable than things they copied, or else they would not have spent their lives working out their great contributions. At the other end of the continuum from our renowned thinkers Barkan (1960) points out that kindergarteners need signs of assurance from their teachers which convey the feeling that their ideas are valued and respected.

In a revised formulation of these principles, we included as a separate principle the idea of providing opportunities for self-initiated learning and giving credit for it. Initially, it was considered a part of the principle of showing pupils that their ideas have value. Although there are fairly obvious relationships, the matter of rewarding self-initiated learning now seems important enough and different enough from showing pupils that their ideas have value that it should be stated as a separate principle.

One mark of the highly creative person is his self-starting ability. The problem of parents and teachers is to keep it alive. It is hindered, however, by overly detailed supervision. It is quite possible that too much reliance is placed upon prescribed curricula and that we need to exercise more effort to appraise and credit growth resulting from the student's own initiative.

The reason for evaluating and crediting self-initiated learning and thinking seems quite simple. Because grades are important to students, they tend to learn whatever is necessary to obtain the grades they desire. If we base grades on the memorization of details, students will memorize texts and lectures. If grades are based upon ability to integrate and apply knowledge, they will attempt to do this. In teaching adults, I have found that the principle of encouraging and crediting self-initiated learning is tremendously important. It has freed many of my students to learn things which they are anxious to know and which they have found exciting and valuable to them. Generally, graduate students are too afraid to learn the things that are important to them for fear that they will not learn all that they will be graded on. A description of what has happened in some of these classes will be described in a later chapter.

Provide for Periods of Non-Evaluated Practice

It is difficult for many teachers to realize that it is not necessary to evaluate everything that a child does. Some even feel that they must correct and grade everything that a child does. We have learned of some kindergarten teachers who correct and grade the drawings that their pupils produce. One mother wrote of her son's experiences under such a teacher. The child had been generally recognized as being unusually bright before he entered kindergarten. His mother soon noted, however, that many of his kindergarten drawings were graded as failing because he would add cowboy boots or hats to his teacher's dittoed drawings, or he might even change the dittoed drawing. Crushed by constant failure for such behavior, he apparently stopped trying to learn and is now suspected of being mentally retarded.

Although the principle of unevaluated practice is not as well established as the other principles in our formulation, the evidence suggests that there is a need for periods when a person can learn without threats of immediate evaluation. This would appear to be especially true in regard to the learning of new skills and in creative activities. External evaluation is always a threat and creates a need for defensiveness. As Rogers (1954) points out, this makes some portion of a person's experiencing or sensing denied to awareness. Thus, there is lacking the openness necessary in creative thinking.

There is more behind this principle, however, than the effect it has on reducing defensiveness. Man has a deep need to establish anchors, to maintain contact with his environment. He must continually try things out. He must determine the limits of his abilities, the materials with which he works, and the situation. In creative activities, he must test the medium whatever it is to discover its limits, its possibilities. The personal experiences of others are insufficient. Wilt (1959) explains that children naturally build on what others have discovered to some extent, but that plucking the strings of a violin, discovering pitch in various sizes of nails, testing liquids and solids and temperatures are examples of things that they must do for themselves.

Tie in Evaluation With Causes and Consequences

In asking teachers to apply the principle of tying in evaluation with causes and consequences, we suggested that, in criticizing defects in ideas or in punishing naughty or dangerous behavior, they do so in a way that would foster ability to see causes and consequences of behavior. Special emphasis was placed upon the consideration of multiple possible consequences whenever appropriate. We especially cautioned against the overuse of such remarks as, "This is good" or "This is bad." Instead, it was suggested that they use such approaches as, "I like this because ..." or "This could be improved by ..." and the like.

This principle was included in the present list as a safeguard against a dangerous kind of so-called creative thinking. The divergent thinking associated with creativity can be dangerous as well as beneficial and needs direction and guidance. Thus, it is important that we cultivate the habit of looking for causes and consequences, to refrain from jumping to final conclusions without examining evidence, to learn to examine the validity of different kinds of evidence. This kind of causal thinking does not exclude the encouragement of open-mindedness, tolerance of the opinions of others, and the critical evaluation of one's own thinking. If the teacher himself does causal thinking, it will be easier to encourage children to think in terms of causes and consequences. It will only be natural for him to ask children the basis for their assertions and to think of the possible consequences of their actions.

There is fairly general agreement concerning the value of causal thinking as an educational objective, in spite of apparently limited application in practice. Landreth (1958) maintains that the way in which experiences are presented is the principal determiner of the relationship which becomes apparent to the observer. She explains that children achieve their ideas of causality from the kind of reasons or explanations they are given for rules of conduct. She also contends that children are helped in this process by progressively modifying the rules which govern their conduct to keep pace with their developing ability to exercise judgment and to take responsibility.

Ojemann (1961) has been especially insistent over a number of years concerning the importance of causal thinking. He maintains that creativity and mental health will become both compatible and mutually reinforcing, if people develop a basic causal orientation to their social environment. According to him, the development of the skills of thinking in terms of causes and consequences is at the very base of creative behavior.

Procedures of the Study

In the fall of 1959, the staff of the Bureau of Educational Research with the assistance of four experienced elementary teachers (Joseph Buzzelli, Warren Peterson, Lucille Teppen, and Viola Svensson) developed a manual entitled, Rewarding Creative Thinking, for use in the study to be presented in the next chapter. Somehow there developed a rather widespread demand for this manual among teachers and school administrators. At first, copies were furnished without charge. But, as the demand reached a proportion beyond our ability to supply, it was necessary to make a charge of thirty-five cents per copy, an amount which barely covered production and mailing costs. Within less than six months, approximately 750 copies had been distributed in this manner.

During the winter of 1960, questionnaires were mailed to approximately 150 of the earliest requesters of the manual. Recipients were asked to "seek systematically and consciously to apply in a reasonable way" the five principles which have just been reviewed. We told them that we realized that all teachers to some extent apply these principles in the classroom. We urged them, however, to experiment with a more deliberate application of the principles. We cautioned that all of these principles must be applied within the limitations of the age group being taught. It was emphasized that applications should be continued and consistent rather than just "one-shot treatments." After a period of experimentation, it was requested that each recipient write a description of some specific experience in which they had tried to apply one or more of these principles and to answer certain questions about each experience described. A separate mimeographed sheet was supplied for each of the five principles.

The following questions were used in obtaining the data:

Being Respectful of Questions:

1. What was the question? Who asked it? What were the general conditions under which it was asked?
2. What was your immediate reaction?
3. What was the immediate reaction of the class, if observable?
4. In what way was respect shown for the question?
5. What, if any, were the observable effects (immediate and/or long-range)?

Being Respectful of Imaginative Ideas:

1. What was the idea? Who expressed it? What were the general conditions under which the idea was offered?
2. What was your immediate reaction to the idea?
3. What was the immediate reaction of the class, if observable?
4. In what way was respect shown for the idea?
5. What, if any, were the observable effects (immediate and/or long-range)?

Showing Pupils That Their Ideas Have Value:

1. What was the occasion which provided the opportunity to show a pupil that his ideas are valuable? Who was the child? What did he do? How did he seem to feel about his idea(s)?
2. What did you do to try to show him that his ideas are of value?
3. How did he react to what you did (immediate and/or long-range)?
4. What was the reaction of the class, if observable?

Providing for Unevaluated Practice:

1. Describe the initial assignment and the general situation in which provision was made for unevaluated practice.
2. How did you communicate to your pupils that they were free to experiment, that "it didn't count on the record," etc.?
3. What happened during the practice period?
4. What was the nature of the similar task given "for the record"?
5. How was it rewarded, if rewarded?

Tying Evaluation to Cause and Effect:

1. What was the nature of the behavior to be evaluated? Who was involved?
2. What was your personal evaluation of the behavior?
3. How did you or the class show the relationship of the behavior to cause and/or consequence?
4. What were the effects, if observable (immediate and/or long-range)?

During the first three months of 1960, 114 teachers in thirteen different states and the District of Columbia (Arkansas, Florida, Illinois, Minnesota, Missouri, New Hampshire, North Carolina, North

Dakota, Ohio, Oregon, Rhode Island, Utah, Wisconsin, and Washington, D.C.) completed questionnaires and returned them. They were rather evenly distributed from kindergarten through the eighth grade. Some respondents submitted descriptions of incidents related to each of the five principles. Other submitted descriptions of applications related to only one principle.

Results

How Well Do Teachers Understand and Apply Principles of Rewarding Creative Behavior?

Many of the teachers responding to the request for descriptions of actual experiences in which they believed that they had rewarded creative behavior showed a thorough understanding of the principles by the manner in which they reported anecdotes illustrating the application of principles. The responses of the pupils to their teachers' attitudes of respect and encouragement was enthusiastic and apparently rewarding to the teachers.

On the other hand, quite a few teachers demonstrated by their descriptions an inability either to interpret the meaning of the principles correctly or to cite an appropriate instance of its use. Many of their reports were indeed puzzling. In relating incidents where they were supposed to have shown respect for children's questions or ideas, teachers told of their own plainly evasive, rejecting, or derisive behavior. Asked when they had been reassuring and accepting, they recited occasions when they had actually rebuffed their pupils. It is unlikely, however, that any of the teachers wanted consciously to refute the principles which they had been urged consciously or deliberately to apply in their classrooms. A discouragingly large number simply were unable to incorporate the principles into their teaching.

An attempt was made to judge each incident submitted in terms of whether or not the teacher did, in fact, manifest respect for or reward the creative thinking of their pupils. The results obtained in this way are presented in Table 5.1. It will be noted that only a slight

Table 5.1

Manifestation of Respect or Reward for Creative Thinking of Pupils in Applying Five Different Principles for Rewarding Creative Thinking

	Respect/Reward		Lack of Respect		Mixed/Indeterm.	
Principle	Number	Percent	Number	Percent	Number	Percent
Respect for Questions	36	58.0	18	29.4	8	12.6
Respect for Unusual Ideas	29	51.8	15	26.8	12	21.4
Showing Ideas Have Value	57	91.9	2	3.2	3	4.9
Unevaluated Practice	54	96.4	0	0.0	2	3.6
Cause and Effect Relation	34	68.0	7	14.0	9	18.0

majority of the respondents were judged to have shown respect for the unusual questions and ideas of their pupils. Over 90 per cent were judged to have been successful in rewarding creative thinking both when they attempted to show pupils that their ideas have value and when they provided for unevaluated practice. Only two-thirds of them were judged to have been successful in doing so when they tried to relate evaluation to causes and consequences.

It was noted that in some cases the teacher succeeded in respecting a question or idea but that the class as a whole did not register a similar degree of acceptance. In other cases, the teacher tended to be derisive only to find that pupils held a more respectful attitude. In some cases, this seems to have altered the teacher's behavior. In others, no such evidences could be noted from the responses submitted. Table 5.2 presents the results concerning the degree of respect manifested by the classroom group as a whole, as described by the teacher. In general, the results follow rather closely those reported by the teachers of their own behavior. The greatest difficulties occur in showing respect for unusual questions, showing respect for imaginative or unusual ideas, and in relating evaluation to causes and consequences.

Table 5.2

Manifestation of Respect or Reward for Creative Thinking of Pupils by Classmates When Teachers Applied Five Different Principles for Rewarding Creative Thinking

Principle	Respect/Reward		Lack of Respect		Mixed/Indeterm.	
	Number	Percent	Number	Percent	Number	Percent
Respect for Questions	30	48.4	21	33.9	11	17.7
Respect for Unusual Ideas	29	44.7	18	32.1	13	23.2
Showing Ideas Have Value	46	74.2	8	12.9	8	12.9
Unevaluated Practice	49	87.5	0	0.0	7	12.5
Cause and Effect Relations	26	52.0	8	16.0	16	32.0

Shortly, we shall examine in greater detail what happened when the respondents attempted to apply these principles and the basis on which we determined that the teachers had rewarded or failed to reward creative behavior or that classroom groups had respected or not respected the questions or ideas of their classmates. First, some statement needs to be made concerning why the occurrence of misinterpretations of these principles should be taken seriously. It should be remembered that of the innumerable interactions which took place between the responding teachers and their pupils during the two or three months that they were asked to be alert to opportunities to apply the principles, the incidents chosen must have been either memorable or convenient. Almost all of the reports appeared to be quite candid and free from embellishment. Accordingly, the incidents cited were in some way reflective of the values and attitudes of the teacher. If a teacher does not prize creative thinking, it is difficult for him to cite examples of his encouraging children to behave in creative ways. Some of the teachers who do not value creative behavior may have been trying to tell us that the principles advocated "won't work." It was clear, however, that some teachers honestly tried at an intellectual level to reward creative behavior but their deeper feelings "showed through" this intellectual veneer.

What Happened When Teachers Tried to Respect Unusual Questions

At the outset, it must be admitted that many of the pupil questions reported by teachers constitute a severe test of a teacher's ability to be respectful of unusual questions. The following is a sample of those reported:

1. How do we stay on the earth?
2. Do rocks grow?
3. Could our club have a code?
4. What becomes of men salmon when females go upstream to spawn?
5. Why isn't the plural of cat written as kittens -- because if you have more than one cat, you would have kittens, wouldn't you?
6. Does a baby have a smaller number of bones than we do?
7. Why didn't I get paid for how good I was? (In a variety show)
8. Where does the water on the blackboard go?
9. Why don't people like Negroes?
10. How far does space go and what comes after space?

When categorized according to content,[1] we obtain the following percentage distribution of questions:

Scientific (biological)	22.2%
Scientific (physical)	22.2
Personal	20.4
Sex	11.1
Religious	9.2
Political, historical	9.3
Class procedures	9.3
Others	12.4

It should be noted that some questions involved more than one of the above categories.

In about 54 per cent of the reports, the questioner was identified as a boy and in 11 per cent, as a girl. In the remainder of the cases, the sex of the questioner was not specified. In a few cases the questioner was identified as dull or as of average intelligence, but never as bright or gifted.

In over 75 per cent of the reports, the incident was identified as occurring in the classroom; in five per cent, outside the classroom; in 65 per cent, during class time; in 19 per cent, outside class time; in 56 per cent, as relevant to the curriculum; and in 17 per cent as not relevant to the curriculum.

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[1] All of the percentages in this section are based on an analysis of the 54 reports giving complete data unless otherwise indicated.

The most frequently mentioned immediate teacher reaction was puzzlement (22 per cent of the respondents). Other frequently registered reactions are:

Irritation and annoyance	17%
Avoidance, making light of question	17
Desire to answer questions immediately	13
Surprise or shock	13
Amusement, laughter	11
Admiration, sympathy	7
Interest in finding out himself	6

The most frequently reported classroom reactions are:

Interest, acceptance, excitement	46%
Amusement, laughter, giggles	39
Puzzlement, curiosity	15
Anxiety, tension, etc	7
Irritation, disgust	6
Surprise, shock, etc	6
Disinterest, scowls, etc	6

The most frequently mentioned way of showing respect for questions is "answering the question directly," a response reported by 44 per cent of the teachers who reported an incident related to the application of the principle of respecting unusual questions. Other frequently mentioned ways of manifesting respect for questions are:

Letting the class answer or discuss the question	22%
Helping class answer question by discussing, etc	13
Praise, recognition, etc	11
Helping pupil find answer to question	9
Helping class answer question by reading, testing	9
Stopping laughter	7

Satisfaction on the part of the pupil was reported by 37 per cent of the respondents and increased interest, by 32 per cent, as the immediate effects of the reported attempt to apply the principle of being respectful of unusual questions. Fifteen per cent reported that their pupils developed new insights and seven per cent reported a lack of satisfaction and continued undesirable behavior.

The most frequently reported long-range effects are continued or increased motivation and improved insight or judgment, each given by 22 per cent of the respondents. One-third reported no long-range effect. Seven per cent of the teachers observed an increased respect among their students for the questions of others and the same percentages noted continued curiosity regarding the subject of the question and decreased fear of asking questions among pupils.

The total report was considered in making a determination as to whether or not the teacher did, in fact, show respect for the unusual question reported. Reported immediate reactions such as anger, desire to kick him in the pants, unpleasant sensations, and the like by themselves were not sufficient evidence for a judgment of lack of respect. Such indications might become a part of a pattern of signs which were accepted as indicating a lack of respect for unusual questions. Usually, however, giving an evasive or false answer, failing to deal with the question, scolding the questioner, and admitted pretense were considered sufficient evidence for such a judgment. Laughter or shocked silence and laughter were not regarded as sufficient evidence. If laughter on the part of the teacher was accompanied by immediate or long-range effects such as reluctance on the part of pupils to ask questions thereafter, such a judgment seemed justified.

A few reports might profitably be examined in detail. For example, it is questionable whether the fourth-grade teacher who gave the following report was aware that she had missed an excellent opportunity to apply the principle of treating pupils' questions with respect. She may have actually felt, as she reported, that by labelling the question as unanswerable that she was complying with the spirit of the principle. It may have been, on the other hand, that this report could be the result of some belated prodding from her conscience.

1. What was the question, who asked it, and what were the general conditions under which it was asked?

The question asked dealt with sex; we had a rabbit in our room and discussion was centered around it. All of the class was very much interested in the discussion; a boy asked, "Why do you need two rabbits to have little rabbits?" Everyone joined in and wanted to know.

2. What was your immediate reaction?

My immediate thought was: "Can't teach sex in school." My action was to laugh and casually change the subject.

3. What was the immediate reaction of the class, if observable?

There was keen interest in the question. I observed that a couple drew a little color.

4. In what way was respect shown for the question?

I told the class that there are many questions that are asked that are good, but too hard to answer without going into research.

5. What, if any, were the observable effects (immediate and/or long-range?)

Everyone sort of shrugged it off with teacher-doesn't-know-anything attitude.

In the following illustration, we find a third-grade teacher giving an evasive response to another common question asked by children.

1. What was the question, who asked it, and what were the general conditions under which it was asked?

Concerning my name. My students wanted to know what I was called when I was a little girl. Also, very interested in how old I am. The general conditions were just an ordinary classroom situation when we were becoming acquainted at the beginning of the year.

2. What was your immediate reaction?

I kidded with them -- made up a silly name and an outrageous age.

3. What was the immediate reaction of the class, if observable?

Laughed -- thought it was funny and it was dropped.

4. In what way was respect shown for the question?

They were curious.

5. What, if any, were the observable effects (immediate and/or long-range)?

When report card time came, they found out what my first name was and nothing has been said since. It was just curiosity on their part.

Although the question, "How old are you, teacher?", is nearly inescapable for primary teachers, it is not unusual for a teacher to sidestep it. The reason why this teacher was reluctant to tell her pupils her first name is somewhat more puzzling.

The following incident, described by a second-grade teacher, is reproduced here largely because it illustrates how difficult it apparently was for some of the respondents to produce examples of legitimate applications of the principle of respecting question. She had to recall an incident from a somewhat distant past.

1. What was the question, who asked it, and what were the general conditions under which it was asked?
   I was wearing a sack dress. The children all wanted to know if I was pregnant. I told them that this was the style of the dress but they still did not want to believe this.
2. What was your immediate reaction?
   I was afraid they were going to tell their parents and the school board would hear about it and that would end my job.
3. What was the immediate reaction of the class, if observable?
   I kept telling them that it was just the dress. No dice.
4. In what way was respect shown for the question?
   I don't know but I was getting mad.
5. What, if any, were the observable effects (immediate and/or long-range?)
   Yes, many parents called to congratulate me, even though I was not married yet. Well, it finally worked out. My husband-to-be thought that this was funny and enjoyed this episode. He finally became a teacher himself.

A majority of the reports dealt with more orthodox interpretation of the principle. The attitude of one first-grade teacher, as revealed in the remarks which follow, contrasts sharply with the manner in which the three teachers just cited reported that they showed respect for their pupils' questions.

1. What was the question, who asked it, and what were the general conditions under which it was asked?
   Where does the water on the black board go? This was asked when the board was being washed. The teacher then asked the question of the class. One child thought it soaked into the black board.
2. What was your immediate reaction?
   Return the question to the class. Get their opinions.
3. What was the immediate reaction of the class, if observable?
   Many children said, "Oh, no -- it goes into the air." The boy who answered the question looked embarrassed.
4. In what way was respect shown for the question?
   I said that it did look as though water seemed to soak into the board and thought we would find out what did happen.
5. What, if any, were the observable effects (immediate and/or long-range)?
   Discussion of evaporation. Experiments on causes of evaporation -- heat, air, etc. We fanned a wet black board and saw evaporation take place more rapidly. This all led to a study of water, clouds, rain, fog, etc.

Some of the reports suggest that one of the most genuine ways of showing respect for the unusual questions of children is to become genuinely interested in exploring the question. The experience of one fourth-grade teacher who reported this approach is described below.

1. What was the question?
   What becomes of men salmon when females go upstream to spawn?
   Who asked it?
   Mark Davis.
   What was the general condition under which the question was asked?
   Social Studies class--- study of Seattle and the salmon industry.
2. What was your immediate reaction?
   I'd like to know, too.
3. What was the immediate reaction of the class, if observable?
   Hushed by boldness of question.
4. How was respect shown for the question?
   I was interested and admitted this interest. I read the entire life story of the salmon and other supplementary material.
5. What, if any, were the observable effects (immediate and/or long-range)?
   Immediate effects, intense interest in the life of the salmon. Long-range effects, class, as a whole a shy group, less afraid to ask questions and display interest.

It was observed earlier that one reason why teachers sometimes discourage questions or fail to be respectful of the questions of children is that they stir up things which the teacher would prefer to forget or to ignore. The following report is an example of this type of threatening question and a brief description of the way in which a sixth-grade teacher coped with it.

1. What was the question, who asked it, and what were the general conditions under which it was asked?
   Question: Mr. Nelson, would you turn Communist, if the Russians captured America?[1]
   Asked by: Robert Koski.
   Conditions: During social studies period, while discussing living conditions of the Russian people. We were studying the unit on the Soviet Union.
2. What was your immediate reaction?
   Does he feel we eventually will be attacked by the Russians? Why?
3. What was the immediate reaction of the class, if observable?
   General reaction: What would happen if America were attacked and captured?
4. In what way was respect shown for the question?
   The children really, seriously considered or thought about the question.

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[1] All names are fictitious.

5. What, if any, were the observable effects (immediate and/or long-range)?

General conclusion was that, even though the question provoked a bit of insecurity, that through being good American citizens, upholding our national traditions, we would not be conquered by Communism. The spirit of freedom must continue to prevail.

It is interesting to note that the teacher reported that the children thought seriously about the question, but he never indicated that he himself thought seriously about the question. The original question was a threatening one, "Mr, Nelson, would you turn Communist if the Russians captured America?" Admitting that the question would be threatening to almost any American citizen, it seems to us that Mr. Nelson was evasive and did not consider the question asked.

Since it has often been asserted that children lose much of their curiosity by the time they reach the third grade, a comparison was made of the judged respect manifested by primary teachers and that of the intermediate grade teachers. The results are presented in Table 5.3.

Table 5.3

Comparison of Primary and Intermediate Grade Teachers on Respect for Unusual Questions of Pupils as Reported by Teachers

	Primary		Intermediate		Total	
Level of Respect	Number	Percent	Number	Percent	Number	Percent
Definite respect or reward	23	71.9	13	43.3	36	58.0
Mixed or indeterminate respect	3	9.4	5	16.7	8	12.6
Lack of respect or reward	6	18.7	12	40.0	18	29.4

Chi-square = 5.22; df = 2; p $\cong$ .07

Although the differences are significant at about only the .07 level of confidence, the expected trend is definitely present. Seventy-two per cent of the reports of primary teachers compared to 43 per cent of those of intermediate-grade teachers were judged to manifest respect for unusual questions. Similarly, 40 per cent of the intermediate-grade teachers compared with 19 per cent of the primary-grade teachers were judged to have manifested a lack of respect for the unusual questions of their pupils.

Being Respectful of Imaginative or Unusual Ideas

The second of the recommended principles, "Be respectful of imaginative or unusual ideas," is sometimes difficult to apply in the elementary grades because a part of the teacher's job is to disentangle fact from fantasy with young children and to move them from fantasy to a sounder type of creative thinking. However, it seems essential that fantasy be kept alive until a child's mental development is such that he can move to this sounder type of creative thinking. Hopkins (1956) maintains that "since the child will create himself in whatever environment he may be located, it seems reasonable that classrooms should furnish the emotional tone, the basic experiences, and the emergent intelligence through which each person, including the teacher, can continue his development."

Let us explore now more specifically the nature of the problem involved in being respectful of imaginative or unusual ideas by examining what happens when teachers try to apply this principle.

Suggestions for demonstrations or experiments and naive concepts are the two types of ideas most frequently reported by the respondents (about 20 per cent in each category). The following types of ideas were also mentioned frequently:

Idea for an assembly program or other special event	13%
Fantasy behavior, story of imaginary person, etc.	11
Idea for a drawing, painting, etc.	9
Invention, innovation, etc.	7
New classroom procedure	5
Challenge of a concept presented by teacher, text, etc.	5

About two-thirds of the initiators of the ideas were identified as boys and only 18 per cent were identified as girls. The sex of the other initiators of ideas was not identified. In about 15 per cent of the cases, the initiator was identified as "lonely" or "isolated."

About 56 per cent of the incidents reported were identified as occurring during a classroom discussion or other classroom activity. Twenty-three per cent of them were identified as occurring outside the classroom.

The single most frequently reported teacher reaction was pleasure or approval (34 per cent of the incidents reported). Other frequently reported reactions include:

Silly, immature, unreasonable, wild, fantastic	20%
Surprise, shock, skepticism, etc.	18
Disapproval, attempt to dissuade, etc.	18
Compassion, pity, sympathy	9
Recognition of idea as original, thoughtful, etc.	9
Grasped as motivation for a new unit	5
Amusement, laughter, etc.	5

The most common classroom reaction reported by teachers in response to imaginative or unusual ideas was "interest, excitement, and approval" (39 per cent). Other common classroom reactions are:

Laughter, amusement, giggling, etc.	21%
Puzzlement, surprise, doubt, etc.	13
(Failure of teacher to observe or recall pupil reaction)	13
Disapproving, restraining, etc.	9
Stimulation of ideas	5

The following are the most frequently reported ways by which respect was shown for imaginative or unusual ideas:

Discussed, explained, considered	39%
Approval of class	21
Experiment conducted, idea tested, etc.	14
Idea, contribution, etc. accepted or used	14

Stimulated other activity	9%
Some other activity substituted	7
Idea evaded, smoothed over, etc.	4
Treated same as other productions	4

The most commonly reported immediate effects are:

Satisfaction, pleasure, etc.	39%
Interest, motivation, etc. aroused	35
Sustained effort	18
Continued curiosity, questioning, etc.	7
Superior work produced	4
Substitute idea found	4
Reality test made	4

The most frequently mentioned long-range effects are:

Satisfaction, sustained interest, etc.	23%
Change in attitude, behavior, etc.	23
New pupil insight	11
Stimulus for other original ideas	9
Execution of experiment at home, discussion at home	5
Not satisfied, rejection of idea	5

It will be observed that the reports of the teachers reflect a great deal of scoffing at imaginative or unusual ideas. The following experience of a Minnesota teacher illustrates that many teachers must be on guard against scoffing at what may at first appear to be a ridiculous idea.

1. What was the idea, who expressed it, and what were the general conditions under which the idea was suggested?

In a recent weekly reader the class read an article on how scientists are making plans to use underground atomic explosions to remove mountains of dirt for building harbors along coasts. The question was asked by Gordon: "Would the explosions caused by the use of several bombs for building harbors in different parts of the world affect or jar the position of the earth so that it might have an effect on its movement, such as rotation or revolution?"

2. What was your immediate reaction to the idea?

My immediate reaction was that the question seemed rather far-fetched, but at the same time it showed some good thinking, so the question was discussed by the class.

3. What was the immediate reaction of the class, if observable?

The class expressed ideas on the possible destructiveness of atom bombs, but didn't agree that the use of atom bombs would have any effect on the earth's movements.

4. In what way was respect shown for the idea?

The class suggested that Gordon find out more about the atomic bomb and its uses and report to the class on his findings.

5. What, if any, were the observable effects (immediate and/or long-range)?

The class became aware of the great imagination and skill of scientists in the use of atomic energy for peace.

Elizabeth Drews (1961) warns that it is not easy for a teacher to embrace this principle wholeheartedly: "Teachers must be quite secure and quite able before they feel free to allow children to think, to question, and to discover." The dividends in pupil growth are usually great, however, when the teacher is willing to give pupils an opportunity to communicate the results of their experiments and self-initiated learning. The following incident reported by a first-grade teacher is an example of what usually happens when this is done.

1. What was the idea, who expressed it, and what were the general conditions under which the idea was suggested?
   The idea was a science experiment to be set up by a boy who had tried it at home, following several class discussions. He mentioned several experiments about floating and magnets and suggested demonstrating each. Conditions were a normal class discussion about floating and non-floating objects, but the boy who contributed had always seemed to have a passive attitude.
2. What was your immediate reaction to the idea?
   I was thrilled to think we had finally hit upon a subject of interest to him.
3. What was the immediate reaction of the class, if observable?
   Quite excited and eager to see the experiments carried out.
4. In what way was respect shown for the idea?
   The boy was asked to bring the needed items and was allowed to show what he had discovered on his own time.
5. What, if any, were the observable effects (immediate and/or long-range)?
   Every child seemed to be interested enough to carry out some experimenting at home and several brought their experiments and conclusions to share with the class. The passive interest of the boy became very active, not only in the area of science, but all other subjects. His attitude changed almost completely from not caring to high interest.

As in this case, it is interesting to note from the data already presented that in 39 per cent of the reports submitted the classroom reaction was one of "interest, excitement, and approval." Such a response naturally makes it easier for the teacher to provide opportunities for experimentation. It is a different matter when the immediate response of the class is one of rejection. It is difficult to support and protect a minority of one, as we see in the following report.

1. What was the idea, who expressed it, and what were the general conditions under which the idea was suggested?
   The idea was to pretend that everyone was a different animal and how it felt to be this animal. One of the girls in my top reading group expressed the idea. We were studying the settlement of the West and different animals were mentioned (fourth grade).
2. What was your immediate reaction to the idea?
   My reaction was that it had possibilities if motivation could be brought up.
3. What was the immediate reaction of the class, if observable?
   The class thought that it was sort of childish.
4. In what way was respect shown for the idea?
   We discussed the idea and different possibilities were brought up -- things that could be brought in.

5. What, if any, were the observable effects (immediate and/or long-range)?

The class carried through with the project, making it into a play. Everyone took the role of a different animal. Research was done on each animal, his habits, home, and eating, and a play was produced out of our findings.

Another teacher reported a project in which pupils had written stories about such topics as "My Life as a Paper Sack," "My Life as a Sweater," and the like. They drew pictures of themselves in these roles and wrote interesting stories of their adventures. Some teachers regard such activities as silly. Teachers who hold this view might find it useful to read W. J. J. Gordon's book, Synectics (1961) which contains many examples of how such imaginative activities have been used deliberately by scientists and inventors in making discoveries and inventions of social importance.

Being respectful of the imaginative and unusual ideas of children may also involve "taking them seriously" and at times this may be difficult. The teacher who reported the following incident had such a problem.

1. What was the idea, who expressed it, and what were the general conditions under which the idea was suggested?

One little boy said that he was mad that they had sent a monkey to the moon. He would like to go there instead. He was going to write a letter to the President and tell him to send him to the moon.

2. What was your immediate reaction to the idea?

I just laughed until I really knew that he was darn serious.

3. What was the immediate reaction of the class, if observable?

They all laughed.

4. In what way was respect shown for the idea?

We tried to tell him why animals were sent up because if they were lost we'd have humans left to keep trying to get to the moon.

5. What, if any, were the observable effects (immediate and/or long-range)?

He was pretty mad and said that he was going to talk it over with his dad.

As in the case of "being respectful of unusual questions," the entire report was used in making a decision as to whether or not respect was shown. Such remarks as the following were used to alert the judge to the possibility of lack of respect but were not used alone in making the determination:

"I laughed."

"I was embarrassed to death."

"I was ready to slug him."

"I was surprised at this kind of thinking from a boy in the upper quartile in intelligence."

"I really thought he had flipped."

"I was shocked."

"I stopped the discussion."

Table 5.4 shows a comparison of the judgments concerning the manifestation of respect or lack of respect by primary teachers and intermediate teachers. It will be observed that there is a tendency for the primary teachers to reflect greater respect for the ideas of children than intermediate grade teachers. The difference, however, is not statistically significant.

Table 5.4

Comparison of Manifested Respect for Imaginative or Unusual Ideas by Primary and Intermediate Grade Teachers

Teacher Reaction	Primary Number	Primary Percent	Intermediate Number	Intermediate Percent	Total Number	Total Percent
Respect for imaginative ideas	17	61	12	43	29	52
Mixed respect with lack of respect	7	25	5	18	12	21
Lack of respect for imaginative ideas	4	14	11	39	15	27

Chi-square = 4.46; df = 2; $p > .10$

Showing Children That Their Ideas Have Value

Wilt (1959) counsels teachers to exploit carefully and subtly any hint of creativity which reveals itself in the classroom. One of the best ways to make certain that creativity is not frightened away is to show children that their ideas have value. This principle seems to be one of the fundamental tenets in the teaching philosophy of those teachers who offered the most clear-cut evidence in their reports of the importance of showing children that their ideas have value.

An analysis of the kinds of signs reported by teachers to indicate that they had respected the ideas of their pupils by showing them that their ideas have value is presented in Table 5.5. It will be noted that

Table 5.5

Signs Reported by Teachers That They Respected Creative Thinking When They Tried to Apply the Principle of Showing Children Their Ideas Have Value

Reaction Reported	Number	Percent
Used or applied idea, material, etc. contributed by pupil	36	58.0
Provided time to implement idea, changed schedule, etc.	21	33.9
Demonstrated idea was true or permitted pupil to do so	14	32.6
Permitted or encouraged further inquiry	13	21.0
Listened or watched with interest	12	19.3

Table 5.5: cont.

Reaction Reported	Number	Percent
Agreed with, approved, or praised idea	10	16.1
Provided materials or other resources to implement idea	9	14.5
Gave public credit or recognition for authorship of idea	7	11.3
Questioned originator of idea further	5	8.0

the most frequently cited category is one involving the use or application of the ideas contributed by pupils. After all, this is perhaps the most rewarding thing which can happen to one's ideas. Time to implement an idea and a chance to demonstrate or prove that one's idea are valid were also cited quite frequently, other extremely important kinds of reward.

A similar analysis of pupil behaviors in response to the teachers' efforts to show children that their ideas have value is included in Table 5.6. Here it will be noted that the most frequently noted reaction of pupils is one of pleasure and satisfaction. Of course, all of the other categories in some way or other connote pleasure and satisfaction (approval, following through, absorption in task, and the like).

Table 5.6

Pupil Behavior Reported by Teachers When Teachers Tried to Apply Principle of Showing Children Their Ideas Have Value

Reaction Reported	Number	Percent
Expressed pleasure, smiled, brightened with happiness, etc.	27	43.5
Expressed approval of classmate's idea, performance, etc.	23	37.1
Followed through with idea, imitated, etc.	20	32.2
Enthusiastic, absorbed activity	18	29.0
Increased acceptance of originator by classmates	15	24.2
Increased interest in learning, increased participation	15	24.2
Spread of creative ideas, confidence in other areas of work	10	16.1

The following report by a first-grade teacher illustrates why it is important to show children that their ideas have value.

1. What was the occasion which provided the opportunity to show a pupil that his ideas are valuable? Who was the child? What did he do? How did he seem to feel about his idea(s)?

   The class was writing a poem to set to music. We were discussing snow and its qualities, trying to discover rhyming words. Jess is bashful and hesitates to contribute although he has a vivid imagination. He mumbled something about snow looking like jewels. He seemed embarrassed that snow looked like jewels to him.

2. What did you do to try to show him that his ideas are of value?

I was very pleased that he could see beautiful things as jewels in the snow and encouraged him to tell us why snow made him think of jewels and what kind of jewels he thought of.

3. How did he react to what you did (immediate and/or long-range)?

He sensed the approval of the class and their approving of "snow looking like jewels." He said that snow seemed to look like diamonds. When asked why he thought so, he said that it sparkles. We were able to use his idea in our song. "It sparkled like a diamond bright." This led Jess to have more self confidence and he expresses himself more freely. The class benefits by this as he has an exceptionally large vocabulary plus a vivid imagination.

4. What was the reaction of the class, if observable?

The children were delighted with his choice of words for it sparked their imaginations as well as contributed to the song we were writing.

This teacher perhaps unknowingly reinforced what appears to be an exceptionally important kind of creative behavior -- the use of analogy. Young children and outstanding creative people seem to have a natural tendency to analogize, but some observers have noted that this ability seems to fade out as children proceed through school. Perhaps it is because children are embarrassed that they think in terms of analogy because "it isn't really like that." In other words, the child knows that snow does not really contain diamonds so he is embarrassed that he sees snow in this unreal way. Perhaps this teacher has taken an important step in keeping alive this boy's apparently excellent ability to analogize.

Many of the teachers showed through their reports that they understood and could apply the principle of showing children that their ideas have value. The skill with which many of them handled their pupils' venturesome ideas was heartening.

Clark (1951) has hypothesized that "a teacher's reaction to pupil behavior is unalterably bound up with her personality." If such is the case, the fifth-grade teacher who submitted the following report has several of those personality characteristics which are essential in the teacher who is able to show her pupils that their ideas have value.

1. What was the occasion which provided the opportunity to show a pupil that his ideas are valuable? Who was the child? What did he do? How did he seem to feel about his idea?

Our class had been going through the morning routine of taking lunch money, attendance, giving news, giving the pledge and singing the anthem under my direction. One morning a girl, Sue -- a bright child with many new ideas -- told me she thought it would be a good idea if the president of the class took charge at this time and that they might call this a class meeting. She felt quite strongly about this and asked me what we had a president for if he didn't do anything. (We had in reality been having a meeting, but it wasn't their meeting and she thought it might be useful to use the time in this way.)

2. What did you do to try to show him that his ideas are of value?
I simply told her that it might be worthwhile to try it and see how it worked. I told her that the officers of the class might get together each day and plan this meeting and could take care of discussing any class problems at this time.
3. How did he react to what you did (immediate and/or long-range)?
She was very pleased that I would try her idea and simply told me, "Thank you!"
4. What was the reaction of the class, if observable?
The class liked this idea very much and when it was tried, they got more out of this period than they ever had under my supervision. They showed much respect for their president and carried on very mature discussions during this time. The period had become more meaningful for them. Many of the children looked to Susan as one with a great idea and wondered why no one had thought of it before.

In contrast to the preceding anecdote is the following report by a third-grade teacher who was evidently unable to support the idea of one of her pupils.

1. What was the occasion which provided the opportunity to show a pupil that his ideas are valuable? Who was the child? What did he do? How did he seem to feel about his idea(s)?
We were putting a song we wrote to music, as well as making up individual songs. This one little girl got up and started to sing a song she had composed and everybody laughed at her.
2. What did you do to try to show him that his ideas are of value?
The song she sang was good and had a lot of truth in it even though some of the words were funny.
3. How did he react to what you did (immediate and/or long-range)?
She felt hurt that the class had laughed at her contribution.
4. What was the reaction of the class, if observable?
(No reply.)

Apparently this third-grade teacher was sensitive enough to recognize that the child's song had a message, a truth, and that the child was hurt by her classmates' laughter and ridicule, yet she was evidently helpless to do anything about it. She evaded stating what she (the teacher) did to show the child that her ideas had value by acknowledging (apparently to herself) that the child's song was good and had a lot of truth in it. It is interesting that this teacher was impelled to select this incident from the many others that she might possibly have given.

Some of the respondents in their reports manifested a keen sensitivity which enabled them to forestall incidents such as the above or to make such painful experiences into constructive ones. One second-grade teacher reported, "At first I had a feeling that some children were about to laugh at the suggestion, but because I quickly acknowledged the contribution, no embarrassing laughter took place." Another wrote, "I showed respect for his idea by my interest, surprise, and delight." It is in such an evaluative condition that the following behavior of a first grader could occur: "He seemed to feel positive about what he said and did not look at the other children to see their approval or disapproval..."

In no case reported was a child described as haughty or arrogant in regard to his idea. In fact, most of them were described as being rather humble about their ideas. The following appears to be a rather sensitive observation about this kind of behavior: "Mark is rather unassuming and didn't show any particular outward expression although his idea was offered spontaneously. He must have had an inner satisfaction or he may not have even volunteered. He rarely contributes to class work and often escapes reality with daydreaming."

Unevaluated Practice

In preparing their reports on applications of the principle of unevaluated practice, teachers were instructed to describe an incident in which they had had pupils do something for practice, just experimenting, with no threat of evaluation, and later had them perform a similar task "for the record." Although we realized that this principle would perhaps be least familiar to teachers, we had not expected as much distortion of the principle and lack of genuine understanding as the reports reflected. In spite of this, however, it is interesting to note that 46 (82 per cent) of the 56 incidents submitted were described as successful. As indicated in Table 5.7, eight of the ten unsuccessful experiences reported were in the intermediate grades. The difference in proportions is thus significant at about the .05 level of confidence. It was also observed that almost all of the failures occurred in regard to the practice of skills or already learned tasks rather than in creative activities or new tasks or content.

Table 5.7

Reported Success or Failure of Unevaluated Practice by Primary Grade Teachers and Intermediate Grade Teachers

Grade Level	Success Number	Success Percent	Failure Number	Failure Percent
Primary	28	93.3	2	6.7
Intermediate	18	69.2	8	30.8
Total	46	82.1	10	17.9

Chi-square = 3.78; df = 1; p $\cong$ .05

The following report is typical of those submitted by teachers who either did not understand the principle or could not accept it, although they somehow felt that they had demonstrated it.

1. Describe the initial assignment and the general situation in which it was given.

   This will kill you. The children knew that my birthday was coming up and so they decided that they would collect money. They all had to bring a dime to buy a present. They did not know the date of my birthday but they thought that they would all bring a dime each day and get it back at the end of the day. Someone would tell them of the day and they would then have the money and go out and buy something.

2. How did you communicate to them that they were free to experiment, that it didn't count on the record, etc.?
I knew about it but didn't want to kill it so I let out when the day was.
3. What happened during the "practice" period?
They were all getting tired of bringing their dimes back and forth to school.
4. What happened immediately after the practice period?
They finally got a chance to bring their dimes to school and use them for good use.
5. What was the nature of the similar task given for "the record"?
They then had a big surprise party for me. (I'm sorry to say that it was months ahead of my birthday but I couldn't let them keep on bringing their money for that period of time.)
6. How was it rewarded, if rewarded?
(No response.)

Aside from the rather bizarre nature of this teacher's interpretation of the principle, there is the issue of her dishonesty in giving the incorrect date of her birth. Anything which conditions for dishonesty is probably inimical to creativity.

A summary of the signs reported by teachers to indicate that they had rewarded creative thinking when they tried to apply this principle is shown in Table 5.8. It will be noted that mention was made in about one-half of the reports that a later performance was evaluated either by the teacher or by being produced for the public. Large percentages indicated that the excitment of an interesting activity and the

Table 5.8

Signs Reported by Teachers That They Respected Creative Thinking When They Tried to Apply the Principle of Unevaluated Practice

Reaction Reported	Number	Percent
Later performance evaluated, produced for public, etc.	27	47.2
Conducted exciting and interesting activity	16	28.6
Showed personal pride in performance of pupils	16	28.6
Recognized subsequent achievement, contribution to future	12	21.3
Simply accepted contributions, gave no marks	12	21.3
Emphasized enjoyment, doing activity for fun, etc.	5	9.0
Gave pupils responsibility for activity	5	9.0
Praised ideas or performance in practice	3	5.4

manifestation of personal pride by the teacher were adequate rewards. Only a few mentioned that they had praised performance during the practice activity.

A similar summary of the pupil behavior reported by teachers is presented in Table 5.9. It will be noted that almost one-half of the

Table 5.9

Pupil Behavior Reported by Teachers When Teachers Tried to Apply Principle of Unevaluated Practice

Reaction Reported	Number	Percent
Manifestation of enjoyment, having fun, laughter, big smiles on face, relaxation of tension	24	41.8
Deep involvement and absorption in tasks	20	34.7
Improved or outstanding performance subsequent to practice	16	28.6
Showed increased motivation	12	21.3
Reported to class on self-initiated or follow-up learning	7	12.5
Showed interest in outcomes	6	10.7
Original work, not stilted or artificial	6	10.7
Wanted to see or read productions of others	5	9.0

reports made some mention of enjoyment, having fun, laughter, and relaxation of tension. Over one-third were perceived as being deeply involved or absorbed in the task. Large percentages were also reported to have improved subsequent performances and to have shown increased motivation.

The fact that there is no evaluation of the practice performance does not mean that there is no need for response on the part of pupils. The aim, however, is to learn, to discover, to develop skills, etc., rather than to earn a grade. The need actually seems to be one of communicating what one had discovered or produced. This itself seems to be rewarding. The intense need to communicate what one has discovered is illustrated by the following report of a teacher of a combined fifth-and-sixth-grade class.

1. Describe the initial assignment and the general situation in which it was given.

   We were just finishing a unit on the Southern states in fifth grade social studies. Several different students volunteered to find out more about some of the important crops of the Southern states and some of their unusual uses.

2. How did you communicate to them that they were free to experiment, that it didn't count "on the record"?

I told the students that this assignment was for their own benefit so that they as individuals might know more about the subjects given. I told them that they would not be expected to report their information to either the class or to me.

3. What happened during the "practice" period?

During the practice period the children could be observed using the encyclopedia and other reference books in the room and in the library to gather information on the subject. Some children brought books from home for others to use.

4. What happened immediately after the practice period?

After finishing their reading, they seemed anxious to tell me and the students some of the things they had learned. I, therefore, allowed time for those who wanted to report their findings to the class.

5. What was the nature of the similar task given for "the record"?

Later in a unit on the Central states, boys and girls volunteered to look up information of a similar kind and they were told that they could orally give a report to the class on their subjects.

6. How was it rewarded, if rewarded?

This task was rewarded by their receiving an "extra-credit" grade in social studies.

The first-grade teacher who prepared the following report also seems to have understood the principle and applied it effectively.

1. Describe the initial assignment and the general situation in which it was given.

We were going to have an art lesson with buttermilk and chalk. The children were wondering how we could draw with buttermilk.

2. How did you communicate to them that they were free to experiment, that it didn't count on the record, etc.?

They were uneasy about smearing the buttermilk and feared they would ruin the chalk. I told them that it is fun to use "new" things and try new things -- just see what would happen when they drew with chalk.

3. What happened during the "practice" period?

The children were delighted with the brilliance of the colors and the textured effects they got.

4. What happened immediately after the practice period?

The children wanted to make another picture, compared it to finger paint, and were pleased with the number of colors they could use.

5. What was the nature of the similar task given for "the record"?

The class made another picture and were more at ease with the media. They had discovered its limitations as well as the ways they could manipulate it.

6. How was it rewarded, if rewarded?

The rewards were the children's pleasure in their pictures.

It was clear from a number of the reports that the respondents believe that anything a child does in school is wasted unless you count it on the record. It is quite possible that it is this kind of teacher attitude that conditions high school, college, and even graduate students to be interested in learning only those things which will appear on examinations or count directly in determining their grades. The following report by a second-grade teacher seems to manifest this attitude.

1. Describe the initial assignment and the general situation in which it was given.

   We were having a lesson on the correct usage of "was and were" for our language class. Later, the children were told that a similar lesson would be included in their conference folder for Parent-Teacher Conferences.

2. How did you communicate to them that they were free to experiment, that it didn't count, etc.?

   I told them that the lesson on that day would be just a practice lesson.

3. What happened during the "practice" period?

   The children were inattentive for the most part.

4. What happened immediately after the "practice" period?

   Some children worked carelessly and slowly, while most of the better students did an average job on the lesson.

5. What was the nature of the similar task given for "the record"?

   All of the children worked much harder, did neater work, and worked with much more speed.

6. How was it rewarded, if rewarded?

   I praised their work, noting how neatly and speedily they had worked. I mentioned how pleased their parents would be to see the papers.

Even in this case, the children may have profited more from the off-the-record practice session than the teacher realized. Granted that the practice session was a waste of time and unsuccessful, several possible explanations might be offered. This kind of listless performance might have been produced by the long-time conditioning of the teacher's attitude that pupils will learn only when you keep books on their performance. Certainly, the teacher offers no evidence that she communicated to the children the purpose of the practice. Thus, the children saw no point in just practicing to be practicing. After all, there should be some definite purposes for practice and these purposes can and should make sense to children.

The following account by a sixth-grade teacher also indicates an adherence to a bookkeeping approach to practice work.

1. Describe the initial assignment and the general situation in which it was given.

   The assignment was to practice 100 addition facts in a four-minute time limit.

2. How did you communicate to them that they were free to experiment, that it didn't count on the record?

   By saying this was in the nature of a review assignment.

3. What happened during the "practice" period?

   The "good" students worked hard but the majority made little effort to master the assignment.

4. What happened immediately after the practice period?

   Most students dismissed the work from their minds.

5. What was the nature of the similar task given for "the record"?
   A 100-problem subtraction test with a four-minute time limit.
6. How was it rewarded, if rewarded?
   By putting their name on a public chart of those who passed.

It is difficult for teachers who have attitudes such as those displayed by this sixth-grade teacher and the second-grade teacher who submitted the preceding report to see the value of activities where young people experiment or play around with materials and ideas. They do not recognize the benefits which can come from an occasional lifting of the pressures to score well or to perform in a prescribed manner. It must, of course, be noted that both of these teachers were concerned about the development of skills related to previously learned functions rather than creative thinking or the mastery of new material. Although we do not know whether unevaluated practice is as effective in developing skills in creative thinking as competition, it has been fairly well established that creative thinking flourishes under circumstances free of undue stress. To rely upon competition to the exclusion of activities which produce fewer pressures upon young people seems unwise.

Is there anything about teaching which makes it difficult for a teacher to accept the principle that it is good to allow pupils to engage in activities solely for the possibilities they offer for growth? Perhaps there is. Teachers traditionally have concerned themselves with the kind of pupil evaluation which can be expressed in numbers, letters, public charts, and the like. For hundreds of years they have been involved in evaluations which measure short-term, incremental change -- the sort which can be measured. Because it is easier to evaluate skills such as those associated with spelling, geography, and arithmetic than mental growth in such areas as critical, flexible, and original thinking, there is a natural tendency for a teacher to over-emphasize activities which can be quickly and objectively evaluated, the kinds of performance which can be "corrected." There may be some disagreement about the grade a student receives on an essay examination, but there is seldom a complaint about the grade he receives on an arithmetic test.

A puritanical prejudice against enjoyment or play may also influence teachers, especially in the upper elementary and high school years, to regard activities in which pupils participate without formal evaluation as being unproductive or wasteful. In 1959, a sixth-grade teacher in Oregon decided with his class to find out if a classroom atmosphere devoid of evaluation and competition could be as conducive to learning as one in which students competed with other students for grades. When confronted by a class which could not be motivated by a grade book, a substitute teacher candidly told the pupils, "It will never work!" It didn't. At the end of the quarter (that was the length of time allotted to the experiment), it was determined that the young performed better when they were evaluated daily. The forces of tradition, parental opinion, and pupil inertia were too great to overcome.

Nevertheless, even the reports submitted by teachers in the present study indicate that young people can learn and gain confidence in their abilities when they are not being evaluated. Among the reports submitted by classroom teachers regarding their application of this principle is the following account by a sixth-grade teacher.

1. Describe the initial assignment and the general situation in which it was given.
I asked three boys to try filtering dirty water. They were told that paper toweling or a cloth inside a funnel could serve as a filter.
2. How did you communicate to them that they were free to experiment, that it didn't count on the record?
I told them that it had been a long time since I had done the same and could no longer remember how I obtained the best filtering. Try to work up a good demonstration for the class.
3. What happened during the "practice" period?
They first used one towel filter in one funnel -- they poured the filtered water through again but used a clean filter. They repeated this seven or eight times to get clear water. Another start was made using a double towel filter. Found it saved time so they hooked up another funnel and filter above the other. Quicker and cleaner.
4. What happened immediately after the practice period?
Materials were put away. The boys were anxious to demonstrate to the class. Very happy with "their new" fast method.
5. What was the nature of the similar task given for "the record"?
The demonstration for the class. Objective: obtain clear water in 15 minutes. The boys used two funnels triple toweled with a piece of sheet (cloth) between the two funnels.
6. How was it rewarded, if rewarded?
Through the praise, amazement and thank you's from the class.

Several teachers reported that evaluation made their pupils tense. A second-grade teacher remarked, "Tension was increased (when a task was evaluated) and some students who knew their facts well made many mistakes." This was especially evident in very young children. Performance is reduced when tension is increased. To be realistic, we must recognize that ultimate evaluation is inescapable and that children do need to learn how to work adequately under stressful conditions. If stress is too great, however, children are unable to learn and to think. It becomes necessary to reduce stress in order for them to perform adequately. After skills have been attained, this kind of freedom from stress becomes less important. The following account illustrates how one fourth-grade teacher used her understanding of these facts.

1. Describe the initial assignment and the general situation in which it was given.
Handwriting has received much more emphasis in our curriculum this year. At fourth-grade level, the big experience is that of using pens for the first time. When the pens were shown for the first time, a general hand-clapping swept through the room, and faces immediately lighted up. My comment: "We have all worked so hard to improve our writing that I think we have now earned the right to try our new pens."
2. How did you communicate to them that they were free to experiment, that it didn't count on the record?
I told the children, directly, that their first work with pens would in no way affect grades. I assured them that all of us had

to practice so that we would know how to handle the pen, how much pressure should be used on the point, and even how to "think" with a pen in hand. The sigh of relief was quite audible.

3. What happened during the "practice" period?

The "practice" period was a great success. I feel that I could safely say that I had never seen such a concerted effort on the part of every child in the room. The effort and concentration was fun to observe. Their evident pride and satisfaction in what they were doing was also rewarding.

4. What happened immediately after the practice period?

When I told the class that we had worked long enough for the first time, they set up an immediate clamor: "Don't make us stop now!" "Can't we work just a little longer?" "May we do this again tomorrow?" The enthusiasm was still at very high level.

5. What was the nature of the similar task given for the record?

After about two weeks of daily practice, I had the children write a little note to take home. In the note, they stated that they wanted their parents to see how well they could write with an ink pen. I was well aware that my marks were a little on the "high side," but I would not have done anything to dampen that eagerness and enthusiasm for the new experience.

6. How was it rewarded, if rewarded?

I feel that the children created their own reward. On Friday morning, when the weekly spelling test is given, they begged to be allowed to use their pens. My personal feeling was that they were not all ready for this experience. But the demand was so insistent throughout the room, that it didn't take me long to give my consent. Again, came the general clapping and "Oh, boy's!" I did assure the children that in all fairness, I would give them the benefit of the doubt, when there would be a question in my mind as to just which letter was meant. This relieved them of any feeling of strain or tension, and they happily wrote their test with pens. I might add that we still have "practice sessions."

There are in this collection of reports a strong indication that the attitudes and values of the teacher are the major determiners of success in applying the principle of unevaluated practice.

Relating Evaluation to Causes and Consequences

When reporting incidents in which evaluation was related to causes and consequences, the teachers who participated in this study most often cited cases of misconduct. Perhaps nothing concerns the average classroom teacher more than discipline. Since the kind of learning which schools emphasize does not take place without the presence of some minimal degree of discipline, their concern is justifiable. Children learn constructive things in a reasonably orderly, purposeful classroom; they usually learn the wrong things in a disorderly, disorganized, purposeless classroom. The following report from a fourth-grade teacher is illustrative of the concern for discipline which most of the teachers revealed.

1. What was the nature of the behavior to be evaluated? Who was involved?

We were taking a field trip and just before we went we had a fire drill. The children were disturbed and ran out of the room yelling.

2. What was your personal evaluation of the behavior?

I was just plain mad, mad, mad.

3. How did you or the class show the relationship of the behavior to cause and consequence?

We really had it out and talked about it. I used the wrong type of discipline...I told them that they were not going on their field trip.

4. What were the effects, if observable (immediate and/or long-range)?

Sadness and feeling of guilt and shame. We did get to go on the field trip and I think they did learn their lessons, even if the wrong way.

The above report is particularly interesting for its manifestation of conflict between the teacher's desire for order and her feelings about the very way order should be achieved. The methods reported for achieving order and for showing the relationship of evaluation to causes and consequences are shown in Table 5.10. It will be noted that group

Table 5.10

Ways Teachers Report They Show Relationship Between Cause and Effect in Rewarding Creative Thinking

Method Described by Teacher	Number	Percent
Used group discussion to show relationships	19	38
Used actual consequences (illness, injury, etc.) to show relationship usually between some non-conforming behavior and unfavorable consequence	11	22
Explained dangers of a certain kind of behavior	6	12
Scolded	6	12
Rewarded changed or improved behavior	4	8
Showed relationship between idea and success of project	4	8
Isolated offending member from group	4	8
Individual conferences to discuss relationships	3	6
Set up firm limits	3	6
Had class to criticize, evaluate	3	6

discussion is the most popular method for showing this relationship. A relatively large number (22 per cent) also rely upon natural consequences such as injury, pain, and illness to demonstrate the relationship between behavior and causes and consequences. In some cases, the pupils themselves made explicit the relationship. In others, the teacher made the point. It will be noted, however, that scolding, isolation, class criticism, and other punitive techniques add up to a sizeable proportion of the methods used by respondents.

A summary of the pupil behavior reported by teachers when they tried to apply this principle is shown in Table 5.11. It will be noted that by far the most frequent category of behavior reported is "improved or changed behavior." Even most of the other categories indicate in some way an improved or changed behavior. It would seem from these data that teachers believe this principle. They perceive positive outcomes from their efforts to tie evaluation with causes and consequences of behavior.

Table 5.11

Pupil Behavior Reported by Teachers When Teachers Tried to Apply Principle of Showing Relationship Between Cause and Effect

Reaction Reported	Number	Percent
Improved or changed behavior of pupil or class	20	40
No repetition of offending behavior	6	12
Improved group behavior and group functioning	6	12
Voluntary creative behavior: apologized, sent letters, made posters	6	12
More problem-solving behavior	6	12
Greater acceptance by peers	4	8
Negative behavior: recurrence of behavior, tantrum, etc.	4	8

Not all of the incidents submitted describe success stories, however. Some of the reports indicate that there was apparently no resolution of conflicts between desires for order and the means of obtaining it. The one which follows, written by a first-grade teacher, is somewhat depressing.

1. What was the nature of the behavior to be evaluated? Who was involved?

   A child broke a milk bottle and when corrected became most disturbed and began a little "tantrum."

2. What was your personal evaluation of the behavior?

   I tried to help him but finally had to use force.

3. How did you or the class show the relationship of the behavior to cause and/or consequence?
   Didn't have time.
4. What were the effects, if observable (immediate and/or long-range)?
   Very poor on all.

We cannot be certain what this teacher is trying to say by submitting this report. Our guess is that she is trying to say that there are times when behavior is so serious and there is no time to show relationships to causes and consequences. All that the teacher can do is to punish or to use force. After all, she had tried to "correct" him after he had broken the bottle.

Few teachers are able to tolerate the kind of aggressive behavior described in the following report by a fourth-grade teacher and at the same time teach what would seem to be a wonderful lesson in respect for individuality.

1. What was the nature of the behavior to be evaluated? Who was involved?
   We were talking about boats and this caused quite a disturbance with a few boys as they own boats and they began to fight over which motor was the fastest. This actually came to a fist fight.
2. What was your personal evaluation of the behavior?
   I was glad that they could respond so as to defend a belief that they had.
3. How did you or the class show the relationship of the behavior to cause and/or consequence?
   We talked about all of the cars there are and made a list of the different ones owned by the families in our own room, and we tried to show that everybody has tastes and they differ.
4. What were the effects, if observable (immediate and/or long-range)?
   The children listened very carefully and discussed the problem. They seemed to respect individual preferences or tastes and from this they asked the boys to bring pictures and information about their boats.

It is interesting to note that the teacher writing this report mentioned no single thought about punishing the boys. She recognized something positive in their willingness to fight for their views and used this to develop in the class a respect for individual differences.

Some of the reports also provide excellent examples of how the application of this principle can be used in helping pupils to accept their own divergency or individuality. The following example is concerned with the somewhat divergent physical characteristic of left-handedness, but the general approach might be applied to many other types of divergency.

1. What was the nature of the behavior to be evaluated? Who was involved?
   Pupil showed great reluctance to attempt to learn cursive writing.
2. What was your personal evaluation of the behavior?
   Child, though larger and heavier than most children in the class, was immature and his coordination was not normal. He was left-handed

and told me his previous teacher insisted that he use his right hand when writing. He was not enjoying success in his endeavors.

3. How did you or the class show the relationship of the behavior to cause and/or consequences?

I told the child that there were several other left-handed children in the class and pointed them out to him. Emphasis was made to all that no attempt to change writing hands would be made. He was shown an example of one of the left-handed writers' work and was encouraged. All his early efforts were praised, regardless of the poor quality (how much better he was doing than he had been doing). After confidence was gained, refinements were made. At no time did the class ridicule his early attempts. In fact, more rapid learners offered assistance.

4. What were the effects, if observable (immediate and/or long-range)?

Marked improvement in writing, spelling, and reading.

It is also encouraging to note that some of the teachers reporting incidents had been able to identify in undesirable behavior a manifestation of strong human needs in the process of going wrong and to transform these into positive, creative behavior. The following account by a second-grade teacher is just such a case.

1. What was the nature of the behavior to be evaluated? Who was involved?

A boy had been collecting pencils unofficially. In other words, he was "lifting" other children's pencils during the noon hour. A parent sent me a note about her child's missing pencils.

2. What was your personal evaluation of the behavior?

This was a simple form of stealing but it is tied in some way to a child's wish to collect. Aha! We need a collecting project and a hobby show! We need to stress mutual aid with permission.

3. How did you or the class show the relationship of the behavior to cause and/or consequence?

We talked about the inconvenience of not finding one's pencil when it is needed. We talked about how good it is to help one another with permission and planned to help one another with hobby collections.

4. What were the effects, if observable (immediate and/or long-range)?

We had a hobby show in the making. I sent out a three-page letter to parents with the request that hobbies be started for an April hobby show. I included some explanatory paragraphs about children's desires for collecting sometimes running rampant and the need for channelising these. I asked for mutual aid with permission, etc. The mother who sent the note was contacted by telephone and she agreed to make bags for collecting for all of the boys. I obtained pieces of cloth free of charge from a local store (odds and ends) and the mother made the collection bags for the boys. Other cloth pieces and pages from pattern books were given the girls for making and dressing paper dolls or for use in any other hobby.

A hobby show is planned in April. Children already have some good hobbies underway, such as key collections, car pictures, railroad trains, model ships and submarines, etc. The mother who wrote the note is delighted with the way the problem was handled. Children are helping one another with their hobbies. They talk about their hobbies and continue to find out things related to them.

Although some educators may not agree with this teacher's interpretation of a child's stealing pencils as a frustrated need to collect, it must be admitted that this teacher was apparently able to transform socially undesirable behavior into positive, creative behavior. Furthermore, he was apparently able to make use of the children's altruistic motivations and use them to enrich the experience for all. This is a far cry from the usual punitive, retributive approach commonly applied in the case of socially disapproved behavior.

The physical circumstances of a teacher's professional life may also be a factor in his concern for order and correct behavior -- that is, since most teachers are close neighbors to other teachers, they are anxious to have well-behaved classes. Several reports indicated that teachers are well aware of their responsibility to keep their pupils from distrubing other classes. Consideration of others must of course be taught all children, and thus it is not surprising that a majority of elementary teachers placed considerable emphasis upon this cardinal social tenet. A sense of obligation to her fellow teachers and to other children in her school is evident in this first-grade teacher's explanation of a cause-and-consequence incident:

> "The children had gone to the gym with a student teacher. Because the other classroom doors are usually open, we walk very quietly down the corridor with little or no talking. One little girl did not conform and was sent back to the room for a few minutes."

The reports concerning the principle of relating evaluation to cause and consequence exposed another common concern of teachers: whether pupils are paying attention to them. Because they do a great deal of talking (directing, admonishing, explaining, reading, etc.), teachers are often worried that their pupils may not be listening to them. Their fear that many youngsters in close physical proximity have "tuned them out" is well-founded. It is true that children do not hear their teachers at various times during the school day, especially teachers who spend a great deal of their time warning, scolding, and exhorting their pupils. The dangerous part, however, is that the youngsters will not listen because they are in the habit of not listening when their teacher's voice takes on a certain quality or pitch. The following report gives us a good picture of the attitude of a second-grade teacher concerning the importance of heeding the teacher's words.

> 1. What was the nature of the behavior to be evaluated? Who was involved?
>
> We discussed safety in the hall. We all decided that we must keep our eyes open at all times and watch where we are going. That morning on the way to snacks a girl walked into a door that was open.

2. What was your personal evaluation of the behavior?
   I wondered if I had made myself clear in telling the students to watch where they were going -- or if the girl had paid attention in class discussion that morning.
3. How did you or the class show the relationship of the behavior to cause and/or consequence?
   The bump that the girl modeled for the next few days was a living example of what happened when one person did not watch where she was going.
4. What were the effects, if observable (immediate and/or long-range)?
   The bump on the girl's face was very effective.

Not all of the reports submitted concerning applications of the principle of relating evaluation to cause and consequence dealt with discipline and attention, however. Among the many "faithful" interpretations of the spirit of the principle was this one by a sixth-grade teacher in Utah.

1. What was the nature of the behavior to be evaluated? Who was involved?
   Student made response in class discussion that was not entirely in keeping with the subject under discussion.
2. What was your personal evaluation of the behavior?
   Child's desire to be recognized by peers for having contributed something of value to discussion caused him to chance a comment even though not sure of the subject.
3. How did you or the class show the relationship of the behavior to cause and/or consequence?
   Changed discussion trend slightly to make students remarks be seen as relevant. Amplified and clarified student remarks to make them more important and applicable to situation.
4. What were the effects, if observable (immediate and/or long-range)?
   Student continues to participate. Not deterred by what might have been a failure in contributing something of value. Maintains an interest in discussion. Earnestly tried to reach solutions in problem-centered discussion.

An incident such as the one just described can often do a great deal to make a child feel that he is worthwhile, that he is making a contribution to the class's progress in gaining understanding. In such incidents it is often difficult to make use of the divergent thinker's contributions, because he sees relationships which his teacher and his classmates miss. Lacking in articulateness, he is sometimes unable to make others see these unusual relationships. Here we have an interesting case of a teacher who met the challenge by extending himself to see relationships and to give relevance and salience to the divergent thinker's contribution. Although this is not, strictly speaking, an example of relating evaluation to cause and consequence, there is certainly a cause and consequence relationship manifested in the manner of the teacher in handling the response and the behavior of the pupil during subsequent class discussions.

Discussion of Results

Limitations of the Study

Although the sample of teacher behavior obtained from the reports might be regarded as fairly representative -- reports were received from 114 teachers of children at every grade level from kindergarten through sixth grade in 35 public and private schools in 13 states and the District of Columbia, it is obviously dangerous to infer too much about the teachers from their questionnaires. No attempt is being made here to equate effective teachers with those who can accept and apply the five principles of rewarding creative thinking (although that is admittedly the bias of the writer). Similarly, there is no reason to conclude that teachers who were unable to interpret one or more of the principles correctly were inferior to those who can understand them. The extent to which the respondents had been exposed to these ideas prior to their reporting would greatly influence their ability to interpret the meanings of the five principles. The picture painted of the rejecting teacher is significant primarily because it exposes the values and teacher characteristics which are antagonistic to change and to divergent thinking in children.

Inferences

Despite confounding factors such as the attitudes of the teachers toward the supervisors or principals who suggested that they participate in the study (this was the case with more than half of the cooperating teachers) and the lengths of time which they were given to complete the questionnaires (some were obviously prepared rather hastily), three general inferences can be drawn from the data:

1. Many teachers were unable to accept these principles because they were not admissible to their value systems. To quote Lecky (1951), "any value entering this system of organization of self valuation which is inconsistent with the individual's valuation of himself cannot be assimilated; it meets with resistance and is likely, unless the general reorganizing occurs, to be rejected."

2. The teachers who were able to accept the principles had value systems which were consonant with those principles.

3. The temperaments or personalities of some teachers do not permit significant alterations to be made in the manner in which they interact with their pupils.

Forces Which Inhibit or Facilitate Application of Principles for Rewarding Creative Behavior

General Characteristics

At least three points need to be noted when it comes to determining teacher values:

1. Teachers are subject to the same sort of frailties, foibles, and fantasies to which other humans are subject.

2. Teachers, like other occupational groups, are conditioned by their work, and thus certain predispositions or sets.

3. They share a third characteristic with their non-teaching brethren, that is, those who enjoy their work do a better job than those who do not.

Let us consider what significance each of these generalizations has for an investigation of teacher values. To begin with, although we recognize that teachers serve as examples for young people (it is sometimes said that they teach more by example than by exclamation), like other human beings teachers have character defects. Some of them are stubborn; and some are vain. Many are defensive. Others are self-centered. Yet, to help children grow in socially desirable ways they must be honest and they must be unselfish; this means that a teacher who attempts to bluff his way through situations in which he finds himself poorly informed or not informed at all will usually lose the respect of his pupils and hence be ineffective in helping them grow morally and intellectually; this also means that the teacher who peremptorily dismisses questions or refuses to allow his pupils to investigate a point or subject which interests them does not fulfill our expectations with regard to the ways teachers should interact with children. Both of these requirements, honesty and unselfishness, are inherent in the principles which the teachers in this study were asked to observe in their teaching.

A teacher's values are shaped considerably by his nature. For example, it is quite difficult for some teachers to allow a child to pursue an unpromising or patently incorrect course of action in his search for an answer. Many teachers find it hard to permit their pupils to engage in activities in which they can practice without being evaluated or "play around" with ideas. Learning is a serious matter to them. On the other hand, when an opportunity for allowing students to learn for the sake of learning arises, insightful teachers encourage young people to investigate, to search for answers. We surmise that some teachers just have to work harder than others at allowing children to practice without being evaluated; they really have to make an effort not to make an overly serious business of the practice sessions.

Judging from the responses of the persons who participated in this study, teachers are much like other people. There are several personality traits, however, which are apparently discernible in teachers to a marked degree. These characteristics may be pronounced in teachers because of the physical and psychological circumstances of their employment. For instance, the time factor bulks large in the thinking of many teachers. If time is not the same force for a teacher as it is for a clerk or a stationmaster or a farmer, if it does not hold the same fears for the teacher as it does for a professional athlete, time does dominate the thinking of many teachers. Innumerable classrooms are run on a rigidly kept timetable, and any serious deviation in the daily schedule is upsetting to the teachers who govern the activities in these rooms.

The explanation for this preoccupation with time can be found -- at least in part -- in the nature of our educational system. In most elementary schools the teacher has nine months to work with his pupils; in most high schools he is limited to a period of about forty-five minutes out of the day's schedule. The actual amount of teaching time is further reduced by extracurricular encroachments of various kinds, by interruptions, announcements, roll-calling, and other procedural matters. Because their time with young people is limited in these and other ways, teachers become extremely conscious of the time factor in the educational process. In addition, they themselves are always faced with the threat of implicit or explicit evaluation. If they are formally evaluated by supervisors or administrators, teachers assume that involved in their evaluation will be measures of pupil growth in respect to the acquisition of certain skills and abilities. Even when they are not evaluated formally, there is always the tacit evaluation of the next teacher who is to instruct their former pupils, not to mention the considerable effect which the community's judgment of their professional competence has upon them. Naturally these threats are very real to the teacher, and he often finds himself quite anxious, very much concerned with whether he will be able to "impart" to his pupils the subject matter and abilities which have been prescribed for them in the allotted time.

Another important trait which seems to be fostered by the circumstances of teaching is the much-publicized tendency to conform. Educational institutions are established essentially to transmit the culture of a society to its youth. Accordingly, it is not too surprising that the individuals upon whom most of the responsibility for putting over society's wisdom and ways are either conservative to begin with or soon become so because of their roles. It is said that teachers are fearful that they will be criticized by administrators and parents, and therefore they act in ways which will spare them censure. This anxiety curtails a significant amount of experimentation and innovation in the public schools. Even when research studies have shown certain techniques to be far superior to traditional ones and they are informed of these findings, teachers are reluctant often times to adopt the new ways. If teachers are in fact anxious about their jobs or emotionally sensitive to criticism, it is understandable if they tend to be conforming.

From the reports, we derived ten personality factors which seem to have contributed to a rejection of the five principles. The teachers who were unable to apply the principles were authoritarian ("Ridiculous for children in second grade"; "Children who lost their place were not allowed to read when their turn came"), defensive ("I was disturbed and felt my students were not involved"; "Everyone sort of shrugged it off-with teacher doesn't know anything attitude"), dominated by time ("Our schedule is so full already"), insensitive to their pupils' intellectual and emotional needs ("She's just a problem child and no matter what you do it doesn't help"), intellectually inert (see some of the misinterpretations above), lacking in intellectual energy ("At this time of day I was ready to slug him" (for suggesting that the room be painted), with information-giving functions ("Evaluation of behavior; he did not listen to directions or follow through"), disinterested in promoting intellectual curiosity in their pupils ("My action was to laugh and casually change the subject"), preoccupied with disciplinary matters ("I was horrified at his actions"), and unwilling to give much of themselves in the teaching-learning compact ("I was quite put out with the girl and at first thought I would not answer such an obvious and silly question").

The reports also revealed that as a group the teachers who could not accept the principles which were advocated placed a high value on the following concepts: time (but not timeliness), orderliness (but not necessarily logical thinking), respect for authority (but not respect for the potentialities of the individual), the child's responsibility to the group (but not especially the teacher's responsibility to the child nor the group's responsibility to the child), the preservation of their self-image (but not the enhancement of their pupils' self-image), and the importance of information (but not the importance of information-getting skills).

Resistance

"Resistance to change" is not listed among the characteristics of the rejecting teachers because it was not evident from the reports that they were any more opposed to change than the teachers who apparently accepted the principles. However, it seems logical to suppose that they were in fact more conservative than the accepting teachers. The kind of teacher who welcomes unusual questions or imaginative ideas is most likely more receptive to new ways of teaching than the type of teacher who rejects this kind of behavior--although no basis for this assumption has been made in this study. Willard (1955) showed that the types of learning experiences provided by teachers in California were dependent upon their values. She found that teachers having a "positive" pattern of values provided three times as many experiences as those with a "negative" pattern of values. Provision of few learning experiences was associated in teachers with values which she described as Personal Freedom, Submissiveness, Power, and Security. (The nine categories of values were: Response, Recognition, Personal Freedom, Helpfulness, New Experiences, Power, Security, Submission, and Workmanship.)

Despite their esteem for orderliness, the rejecting teachers were markedly inaccurate in their spelling, slipshod in their punctuation, and disrespectful of the ordinary rules of grammar. The excerpts which have been presented in this chapter have undergone considerable correction in spelling, punctuation, capitalization, and grammar to improve readability and comprehension.

While the great majority of the teachers who participated in the study gave excellent examples, the characteristics and values of the teachers who gave inappropriate responses presents a picture which is significant for a number of reasons. First, no one disputes the world's desperate need for creative people. However, helping young people realize their talents is no easy matter. As Barnes (1960) says, "there is something personal about the care and feeding of ideas"--and it is especially difficult for teachers who have been oblivious to the dividends which accrue from encouraging children to develop their powers of self-expression. Second, since the teachers who cooperated in the study were instructed by means of the information sheet, Bureau of Educational Research publications, or supervisors and principals as to how they could cultivate creativity in their classrooms, the ones who were unable to apply the principles could not accept them *in spite of the forces which had been exerted to alter their attitudes and values.* Evidently, to cause a change in the manner in which a teacher regards the behavior of pupils requires more than literature or lectures. Third, a considerable amount of research has been conducted regarding teacher attitudes and teacher values, and most of the ten characteristics which were found in the rejecting teachers have been found again and again in other groups of typical teachers. Although the rejecting teachers were decidedly in the minority in this study, it may possibly be that they would be representative of American teachers in general.

While the values and traits of the teachers who participated in this study could not be determined with any degree of certainty from their reports, it was possible to detect an enthusiasm for teaching in the words of a great many of the teachers. As might be expected, those who gave the most detailed reports almost invariably had interpreted the principles correctly. They seemed to enjoy relating the incidents, and they apparently like their jobs. It is true in every occupation but especially true in education, the amount of enjoyment which a teacher receives in an ordinary day is the greatest source of motivation in keeping him employed, despite any handicaps that are involved. Some of the satisfactions which teachers commonly delight in are very much in evidence in the words of the fourth-grade teacher who sent in the following anecdote;

"It was my practice to read to my pupils from Laura Ingalls Wilder's books during cold or stormy noon hours when they could not be out-of-doors. These are true pioneer stories and always interest the children.

"We often dramatized lessons in reading as a culmination activity and this particular group enjoyed that. One noon it was necessary for me to attend a meeting down the hall and I suggested that they 'act out' the particular chapter I had just read. I told them to 'figure it out' by themselves and that I'd be back soon to witness the result.

"When I tip-toed back a few minutes later to see how things were progressing, two leaders were managing--assigning parts, designing costumes from coats, scarves, etc. They were so interested that I deliberately stayed away longer.

"My principal accompanied me back to my room, to give more importance to their effort. We sat quietly at the back of the room as Laura's story was dramatically unfolded. It was beautifully done -- and with no help but their innate understanding of little girls when their much loved pet, because of his advanced age, had to be left behind -- when the family traveled West. I can still hear the 'dog's' pitiful whimper and Mary's tearful goodbye, as they parted.

"Our principal was impressed and asked our group to present their playlet at P.T.A. the following week. This was done, with nothing added but more costumes. I kept hands-off and it was explained that the offering was entirely the children's own.

"In a small community such as ours was, this was an important event and the children were rewarded by the applause and pride of the parents and friends. Of course they were pleased that I, too, was proud of them."

If we look at the teachers and their jobs from this point of view -- the point of view which sees the teachers in our schools as workers, like other workers but with special responsibilities -- the five principles advocated are nothing more than five rules for living up to their jobs as guides for youth.

Conclusion

What is the answer, then? How can teachers acquire values which have been demonstrated to be basic to the promotion of intellectual growth when these values are outside their experience? The only way for a teacher to value principles such as those advanced here is to make them a part of his experience. When an individual has known nothing of the relaxation provided by a massage, he will have no disposition to go to a masseur to find relief from tension. Similarly, if a teacher has never allowed his pupils to probe, to challenge, to test, it is foolish to expect him to encourage his pupils to think critically and creatively--even though he is told how to do it. He does not really understand what is involved in putting into practice principles such as "show your pupils that their ideas have value" or "treat imaginative ideas with respect." These principles are really the manifestations of an attitude he does not possess. The solution lies somehow in providing the teacher with experiences wherein he can see the advantages--or disadvantages--of such techniques. (We must always admit the possibility that even if the teacher does try out the principles of rewarding creative behavior he may find them unsatisfactory in his scheme of teaching; we must allow him the right to be different also!)

There are at least three procedures which can be taken to help teachers who have had no experience in promoting creative thinking gain in this experience. An excellent way to encourage them to value unusual or original ideas is to provide the teachers with materials which are easily administered and which lead naturally into creative performance. Such instructional aids as tapes, films, workbooks, and manipulative materials can be used by inexperienced teachers with a minimum of background on fostering creative activity. Once these devices have been used, the teachers will have more confidence in their ability to bring creative thinking and doing into being. Another way to help provide experiences which will allow teachers to accept the values inherent in the principles of rewarding creative thinking is to have them watch teachers who successfully bring out the talents and imaginations of their pupils. Although this method of influencing teachers is effective in many cases, it certainly is not "sure-fire"; the sets of the observing teachers will determine in large part the nature of their experiences. For most teachers, however, much can be gained by watching an inspiring teacher work with boys and girls.

A third method of insuring a more sympathetic attitude toward the principles of rewarding creative thinking in children is to make the teacher more self-conscious about his role. The process of defining his values and goals should ideally start just after the teacher-to-be has decided upon his career. It should continue as he takes education courses (and non-education courses), undergoes the rigors of student teaching, and matures. When the individual finally walks into a classroom as a full-time teacher he should have refined his ideas about what a teacher should be and how a teacher should act. The important thing is that he be aware of the nature of his relationship with the children in his classroom.

It is next to impossible to pay too much attention to our values in education, particularly during times such as these when they are changing perceptively. Ruth A. Willard's statement (1955) shows clearly why values must always be our major concern: "...whatever values are dominant for an individual at any one time determine his beliefs and actions and direct the use of his energies, skills, and abilities." Actually, the message which comes in loud and clear from these reports of incidents of rewarding creative thinking is that when we ask teachers to behave in certain ways we must take their values into consideration. We have devoted a tremendous amount of thought and energy in trying to understand the learner; it is time we began to examine teachers with as much care.

Chapter 6

IN-SERVICE EDUCATION FOR REWARDING CREATIVE BEHAVIOR[1]

From the data presented in the preceding chapter, it is obvious that rewarding creative behavior in the classroom is a complex matter and difficult for some teachers. Many teachers believed that they were rewarding creative behavior, although it was obvious to the more objective observer, even from the teacher's reports, that many such efforts fell far short of this mark. Recognizing that some media more powerful than the printed page and the lecture are needed to communicate an understanding of the principles which we had developed for rewarding creative thinking, we looked first to the possibilities of in-service education programs.

In-service educational programs have been looked upon by many educational leaders as the most promising development available for improving instruction. In 1960, Hodges reported in the official journal of the Association for Supervision and Curriculum Development that there is scarcely a school district in the United States without some organized in-service plan for professional growth. Hodges stressed at that time the idea that professional growth activities become powerful only through clarity of purpose, carefully planned procedures, and built-in procedures for evaluation. As will be seen shortly, an attempt was made to include these three features in the in-service education program on which the study to be described in this chapter is based.

At the time the present study was conducted, the professional literature on in-service education programs to produce creative growth was quite barren. One interesting study had been reported by Veatch in 1953. This study involved eight experimental groups at the eleven-year age level. The teachers were trained to conduct creative activities in dramatics, writing, and discussion. The program was based on the following elements which were designed to be creative in character:

1. Teachers must allow the choice of participation to lie with the children. Pressure or coercion for participation decreases creative behavior.
2. Right of participation involves right of privacy. The child alone chooses whether or not to unveil his products or talents. Coercion alters creative behavior to something else.
3. Rewards for participation in the activity are unnecessary and can be destructive of the creativity. Its very existence is enough reward and its lack of existence is enough punishment.
4. All end-products must be unique with the producer and the teacher must foster such individuality or uniqueness of product.
5. Group climate, during all or part of the activity, is unmistakably exciting, adventuresome and literally productive of glandular changes affecting heartbeat and breathing.

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[1] The data analyses and other basic materials of this chapter were prepared by Balderaj Luthre with the assistance of Elizabeth Kennedy and John E. Bowers.

6. Teacher as status person must use that status to promote the effective consideration of group desires, including his own without destroying the freedom of participation.
7. Teacher must reflect his own attitude of welcome to all end-products without destructive or critical comment, favorable or unfavorable.
8. All end-products are to be welcomed by all and the discussion of the quality be divorced from the producer's personality.
9. As valuable end-products or valuable talents become apparent, leadership shifts from one personality to another in recognition of the value of products or talents.
10. Sharing and cooperation are integral to the activity. Individual competitiveness is desired. Talented individuals develop for the good of the whole group and are not envied, but admired as the prototype.

With no emphasis on the formal teaching of reading, the experimental group outgained the control group in reading achievement but not in arithmetic achievement. Although no measures of creative growth were used in the Veatch study, it was concluded that creativity has its structure which can be seen, found, taught, and passed on. It was also noted that all children in the experimental group produced something most of the time, all children that produced did so on schedule as well as off-schedule, and all teachers could recall some creative action at one time or another in all children.

The rationale and plan of the present study is very much like those of the Veatch study. The major difference is that an attempt is made in the present study to employ objective measures of creative growth in all grades of the elementary school from kindergarten through sixth grade in a single school. The in-service education program is more definitely focused on the development of creative thinking and methods of rewarding creative classroom behavior than in the Veatch study. The major hypothesis of the present study is that teachers can be educated to value creative thinking in the classroom with the results that their pupils will show greater growth in their ability to do creative thinking than will the pupils of teachers not so educated.

Procedures

The Setting of the Study

A large elementary school with an enrollment of about 650 pupils and 21 teachers was selected as the setting of the study. The school is a modern, relatively new school located in a suburb of the Twin Cities. The neighborhood in which the school is located is rather heterogeneous but includes almost no families which could be regarded as seriously deprived economically or culturally. The school has a lunch program and a large percentage of the children are transported to and from the school by buses.

In comparison with at least a dozen other schools in the area studied by the author and his associates at about this same time, this school was outstanding in two respects. First, the school was a pleasant and comfortable place in which to work. At the end of a full day of work with almost no breaks, the research team felt relaxed and zestful. The fresh air system of ventilation was quite effective and there was none of the fatigue usually experienced from two or three hours of work in other schools. Perhaps even more outstanding was the smoothness of the order and discipline of the school. Just a few minutes before the dismissal bell, classes would start filing into the school gymnasium and assemble by buses. Promptly at the dismissal bell, pupils started loading into the first bus and in less than ten minutes all pupils had been loaded in buses without a single hitch or delay. The atmosphere in this school stood in strong contrast to the picture painted by Jules Henry (1959) of middle-class suburban classrooms -- "an emphasis on initiative and spontaneity which fosters a 'permissiveness' which, in some rooms, sweeps the class to the brink of chaos." Discipline in this school did not seem to be at all oppressive, however.

Before the study was initiated, the author conferred with the Elementary Supervisor and the School Principal and both seemed enthusiastic in their support of the project. The author also addressed the entire school faculty concerning the importance of studying creative behavior and discussed with them the purposes of the study and the procedures which had been planned. The faculty as a group agreed to participate in the study. In order to assign teachers to the Experimental and Control conditions, the names of the teachers were drawn from a hat. In this way, ten teachers were assigned to each condition. The teacher of the special class of mentally retarded children was not included in the study.

The Educational Program

As soon as the teachers had been assigned to the Experimental and Control conditions, each teacher in the Experimental group was given a copy of *Rewarding Creative Thinking: A Manual for Elementary Teachers*, prepared especially for this purpose by Buzzelli, Palamutlu, Peterson, Teppen, Swensson, and Torrance. This manual had already been tested by Buzzelli with the faculty of a similar elementary school in another Twin Cities suburb and by a number of scattered teachers in a number of different states. Almost all of those who had attempted to use the manual reported that it had been useful and a few reported that it had been instrumental in the transformation of their classroom behavior.

The manual had been prepared under the supervision of the author by a group of four experienced elementary teachers and a research assistant. In it, we offered a variety of suggestions for creating a classroom environment which rewards creative behavior. Many illustrations of methods and materials successfully tested by the authors are included. The teacher, however, was given complete freedom in the use of the manual. He was challenged to use his own creativity in making use of the suggestions.

This development was through a seven-day workshop experience conducted by the author. The first day of the workshop was devoted to a general orientation to the project and its aims and the reading of relevant materials assembled by the author and the research assistant. On the following day, the teachers came with an initial outline for the manual and definitions of "creative thinking." At the end of the second day of the workshop, the structure of the manual had been more or less established.

Each teacher wrote a description of some aspect of the classroom environment that rewards creative thinking. These descriptions were then discussed among the members of the group. During these discussions, the ideas were elaborated and modified. Additional illustrations were given by each member of the group from his experience. Next, the teachers prepared illustrations and a list of tested ideas for encouraging creative thinking in the classroom. Appropriate research findings were also added in support of the principles illustrated by the experienced teachers.

In the first part of the manual, an attempt was made to answer in a simple, straightforward manner such questions as:

What is creative thinking?

Why should creative thinking be rewarded?

Can creative thinking be developed?

The manual presents the point of view that children learn and develop along the lines they find rewarding, that creative thinking abilities can be developed, and that it is a legitimate function of education to seek to develop these abilities. An attempt is made to show in concrete, practical ways how teachers can reward creative thinking. Consideration is also given to the tasks of developing sensitivity, encouraging discovery, and deepening the capacity of the child to wonder, to be puzzled. An attempt is made to develop the idea that it is the teacher's responsibility "to encourage, to give freedom, to swing wide the gates to whatever a child's mind wants to explore, to make contact, to know, to grasp, and to stimulate the new."

The writers of the manual also assumed the position that a school environment conducive to creative thinking involves a high regard and respect for the creative child and for the creative needs and tendencies of all children. External evaluation by teachers and peers is important. Creating such an environment also involves such elements of the physical setting as a flexible room arrangement, bulletin boards, display areas, interest centers, lighting, heat, ventilation, and the like.

Specific suggestions are given in the manual for handling unusual questions, ideas, and productions; evaluating novel questions and ideas; developing creative thinking through motivation and increased awareness; and helping the highly creative child to be less disturbing to others. Ideas for book reports, dramatizations, writing, story telling, composing poems and songs, diaries, role playing, dioramas, writing a book, and the like are given in the suggested list of tested ideas. An especially interesting feature of the manual is a set of detailed descriptions of creative projects, one prepared by each of the experienced teachers. The present author then pointed out the theoretical principles illustrated in each and highlighted the teacher behavior which rewarded creative behavior.

During the pre-testing which occurred the week after the assignment of teachers to experimental and control groups the research team talked informally with the teachers concerning their ideas about creative behavior in the classroom. About two weeks after the pre-testing the author and two other members of the research team visited the school for a discussion meeting with the teachers who had been assigned to the experimental condition. In this meeting, an attempt was made to discuss the questions which were bothering the teachers and the problems encountered in trying to implement ideas for rewarding creative thinking in the classroom.

Most of the teachers were bothered by the openness of the experimental condition and expressed a need for being given a specific list of activities to carry out. As a result, they felt that they were having difficulty in behaving differently from the way they have always behaved. In an effort to help solve this problem, they were offered the five principles discussed in Chapter 5. An attempt was made to emphasize the need for the continued and consistent application of these principles rather than some kind of "one-shot" treatment. Each teacher was asked to write out descriptions illustrating their attempts to apply these principles, but not one of them chose to do so.

Some of the experimental teachers were bothered by the whole idea of rewarding creative behavior. While they felt it desirable and necessary to reward other kinds of school achievement, they seemed to feel that there is something almost immoral about rewarding creative achievement. They felt that the creative activity is its own reward. An effort was made to emphasize the intrinsic rewards involved in the principles which they had been offered and to show how it is necessary for the environment to support even these kinds of rewards. For example, it was pointed out that perhaps the greatest reward to the child who asks a question is to find an answer, the greatest reward to the child who offers an unusual idea is to have it considered or used, and the like. The research team felt that it was unable to help the teachers resolve this conflict and that this probably prevented some of them from actually carrying out the experimental treatment.

During the weeks which followed this meeting, some piece of material was mailed to each of the experimental teachers every week or two. The following is a list of materials sent:

1. A mimeographed description of the five principles for rewarding creative thinking discussed in Chapter 5, with an invitation to submit descriptions of incidents in which they had applied these principles.
2. A paper entitled, "Creativity in Mathematics," by Paul C. Rosenbloom, giving some specific suggestions and examples of methods for creative thinking in mathematics in the elementary school.

3. A 34-page monograph by the author, entitled "A Collection of Ideas for Developing Creative Thinking Abilities Through Language Arts." (This monograph contains a vast variety of specific suggestions for creative activities in the language arts.)

4. An article by Gordon M. A. Mork (1959) entitled "A Science Lesson on Rockets and Satellites." (This article gives specific illustrations and examples showing how the ask-and-guess technique can be used in teaching elementary school science.)

5. A 39-page monograph by the staff of the Bureau of Educational Research on the "Minnesota Studies of Creative Thinking in the Early School Years."

Near the end of May, just before the beginning of the post-testing sessions, another visit was made by the research staff to discuss with the experimental teachers their experiences in trying to apply some of the ideas obtained from the manual and supplementary materials. From these discussions, it was rather obvious that the teaching of one of the participants had been greatly transformed and that this teacher had become much more tolerant, if not respectful, of the ideas of her pupils. Some teachers had continued to teach in creative ways but there was little indication that some of the teachers had modified their teaching during this four-month period. On the other hand, it was very obvious from visits to classrooms that some of the control teachers were giving their pupils a great many exciting experiences in creative thinking. Arrangements were made to photograph some of the products and examine some of the creative writings which had resulted from these activities. Indeed, we began to fear the truth of the old admonition, "If you want to get experimental procedures into practice, place everyone in a control group."

One check was made in an attempt to determine the extent to which the two groups of teachers had made use of creative activities. A 57-item checklist of creative activities in language arts modeled after the monograph cited in 3 above was administered to the fourth, fifth, and sixth grade teachers. The experimental teachers reported an average of 26.4 activities compared with an average of 23.5 by the control teachers. The difference is not statistically significant but the data do provide some slight indication that the experimental manipulation was carried out. The indication is certainly not very strong, however.

Collection of Data

During the first half of January, all pupils from kindergarten through sixth grade were administered a battery of creative thinking tests. An alternate form was then administered about the middle of May. Some tasks were common to the batteries for all grades, whereas one of the non-verbal tasks (Picture Construction) was administered only in kindergarten through third grade and one of the verbal tasks (Product Improvement) was administered only in grades four through six. The four test forms used, their reliability, and validity have been discussed in Chapter 4. All tests were administered by the author and a staff of graduate research assistants who had somewhat extensive experience in administering these tests.

The following is an example of the general orientation given the primary classes before the administration of the pre-test:

> "I am ____________ (wrote name on blackboard) from the University of Minnesota. I work with a group of people whose business it is to find out more about how boys and girls learn and how schools can help them learn more and to succeed and enjoy life later on. We are interested right now in finding out more about how boys and girls like you learn to use their imaginations. This is the kind of thinking which we use in making inventions, writing books and songs, discovering new things about the world, new ways of doing things, and the like.
>
> "We want you to help us this morning by doing a few things which will give you a chance to use your imagination. We have three things we'll do here in the classroom and then we have something else which we'll do one at a time outside the classroom. The reason we have to have one of you to come at the time is so that you can dictate your answers to us."

In the fourth, fifth and sixth grades, all tests were administered in groups. The same examiner administered the post-test and pre-test to each class. At the beginning of the post-test, an effort was made to explain the need for a second testing, using the analogy of physical growth with repeated measurements of height and weight. As they had just recently taken their end-of-the-year achievement tests (the Stanford Achievement Test battery), this procedure did not seem to puzzle them. Motivation among the children seemed to be at a high level throughout both the pre- and post-testing activities.

Results

All tests were scored by the same two scorers who held daily conferences and checked one another's work throughout the entire process. Interscorer reliabilities were all in the .90's. Since the kindergarten teacher in the experimental group resigned and was replaced during the study, the results at the kindergarten level are not included in this report. This left nine classrooms in the experimental condition and nine in the control condition. The purpose of the comparisons reported in this section was to determine whether or not the post-test scores of pupils taught by teachers in the experimental group are significantly different from the scores of those taught by teachers in the control group. Comparisons have been made separately for each grade. Analysis of covariance has been used throughout in order to determine if the regression lines for the two groups are significantly different from each other, at each grade level. Results will be reported for fluency, flexibility, complexity, penetration, and originality.

Fluency

A comparison of the fluency scores of the pre- and post-test scores of the experimental and control groups are presented in Table 6.1 for the two tasks which were administered at all grade levels.

Table 6.1

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Fluency, Circles-Squares and Ask-and-Guess Test, Grades One Through Six

		Circles-Squares Test			Ask-and-Guess Test		
		Means			Means		
Group	Number	Pre-	Post-	F-ratio	Pre-	Post-	F-ratio
Grade 1 Experimental	25	8.88	8.92	9.08*	9.68	15.44	0.19
Grade 1 Control	47	8.68	6.00		11.54	16.70	
Grade 2 Experimental	44	10.30	8.04	0.95	13.17	17.35	6.92**
Grade 2 Control	21	12.95	9.33		14.86	13.57	
Grade 3 Experimental	22	12.41	10.18	1.13	17.82	19.77	0.20
Grade 3 Control	36	12.06	8.97		14.03	17.30	
Grade 4 Experimental	45	9.56	9.53	8.03*	10.96	11.62	0.26
Grade 4 Control	18	7.89	11.39		8.61	10.28	
Grade 5 Experimental	50	8.54	12.84	3.63**	12.96	15.29	0.65
Grade 5 Control	23	4.70	8.70		11.74	13.52	
Grade 6 Experimental	26	12.35	15.81	0.57	14.65	15.92	1.94
Grade 6 Control	42	13.48	17.93		19.63	22.22	

* Difference is significant at the .01 level or better

** Difference is significant at about the .05 level or better

It will be noted from Table 6.1 that in only three of the six grades is the difference in mean fluency scores for post-test on Circles and Squares statistically significant, after adjustments have been made for pre-test scores. Except in the fourth and sixth grades, the trend is consistently in favor of the experimental group. In interpreting these results it should be noted that in the primary grades, Circles was administered as the pre-test and Squares as the post-test. The reverse procedure was used in the fourth, fifth, and sixth grades. As already reported in Chapter 4, the Squares Test is a more difficult task than the Circles Test, insofar as fluency is concerned. Thus, there is no need for alarm regarding the apparent drop on this measure in the primary grades.

Only in the second grade is there a significant difference in the only other test administered in all grades, the Ask-and-Guess test. The second graders in the experimental group have higher scores on this measure than do their peers in the control group. The trend is in favor of the experimentals in the first and fifth grades but not in the third, fourth, and sixth.

The data concerning the fluency score on the Product Improvement Test are presented in Table 6.2. It will be noted that only in the fifth grade are the differences statistically significant. This difference is in favor of the experimental group. The trends are in favor of the controls in the fourth and sixth grades. It should be noted that the sixth grade teacher and one of the fourth grade teachers in the experimental condition had serious conflicts concerning the concept of rewarding creative thinking and reported having conducted relatively few creative activities during the study.

Table 6.2

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Fluency, Product Improvement Test, Grades Four Through Six

Group	Number	Means Pre-	Means Post-	F-ratio	Level of Significance
Grade 4 Experimental	45	8.70	9.30	0.001	Non-signif.
Grade 4 Control	18	7.89	11.39		
Grade 5 Experimental	50	7.39	13.53	11.11	<.01
Grade 5 Control	23	7.35	9.65		
Grade 6 Experimental	26	9.54	12.35	0.57	Non-signif.
Grade 6 Control	42	11.36	14.57		

Flexibility

Flexibility scores were obtained only for the Circles-Squares and the Product Improvement Tests. Table 6.3 presents a comparison of the pre- and post-test means of the experimental and control groups on the flexibility score of the Circle-Squares Test for grades one through six It will be noted that the differences, when adjusted for pre-test scores, are statistically significant for the first, fourth, and fifth grades. In the first and fifth grades the differences are in favor of the experimental condition, whereas the reverse is true for the fourth grade.

Table 6.3

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Flexibility Score of the Circles-Squares Test, Grades One Through Six

Group	Number	Means Pre-	Means Post-	F-ratio	Level of Significance
Grade 1 Experimental	25	6.84	8.44	15.78	<.001
Grade 1 Control	47	6.57	5.06		
Grade 2 Experimental	44	7.30	7.25	0.01	Non-Significant
Grade 2 Control	21	8.71	8.19		
Grade 3 Experimental	22	8.77	7.82	0.004	Non-Significant
Grade 3 Control	36	9.42	8.14		
Grade 4 Experimental	45	8.36	8.04	8.75	<.01
Grade 4 Control	18	6.78	9.44		
Grade 5 Experimental	50	8.16	10.38	8.25	<.01
Grade 5 Control	23	4.04	7.52		
Grade 6 Experimental	26	8.35	11.15	0.13	Non-significant
Grade 6 Control	42	9.64	11.29		

The results concerning the flexibility score of the Product Improvement Test are presented in Table 6.4. The differences are statistically

Table 6.4

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Flexibility Score of the Product Improvement Test, Grades Four Through Six

Group	Number	Means Pre-	Means Post-	F-ratio	Level of Significance
Grade 4 Experimental	45	3.52	3.52	1.15	Non-Significant
Grade 4 Control	18	3.11	3.94		
Grade 5 Experimental	50	3.86	5.06	6.08	<.05
Grade 5 Control	23	4.04	4.00		
Grade 6 Experimental	26	4.46	4.50	3.84	Non-Significant
Grade 5 Control	42	5.24	5.71		

significant only at the fifth grade level, with the experimentals having a definite advantage over the controls. The differences observed in the fourth and sixth grades actually favor the controls, although the size of neither of the differences reach statistical significance.

Complexity or Elaboration

Complexity scores were obtained for the Circles-Squares, Incomplete Figures, and Picture Construction Tests. The comparative data on the complexity score of the Circles-Squares and Incomplete Figures Tests are presented in Table 6.5. On the Circles-Squares Test, the differences are

Table 6.5

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Complexity (Elaboration) Scores of the Circles-Squares and Incomplete Figures Tests, Grades One Through Six

		Circles-Squares			Incomplete Figures		
		Means			Means		
Group	Number	Pre-	Post-	F-ratio	Pre-	Post-	F-ratio
Gr. 1 Exper.	25	10.80	7.32	0.01	4.64	5.84	0.14
Gr. 1 Control	47	9.85	7.06		5.93	6.31	

Table 6.5: cont.

		Circles-Squares			Incomplete Figures		
		Means			Means		
Group	Number	Pre-	Post-	F-ratio	Pre-	Post-	F-ratio
Gr. 2 Exper.	44	14.82	10.70	2.43	9.59	7.46	0.32
Gr. 2 Control	21	17.57	9.62		8.67	7.76	
Gr. 3 Exper.	22	17.82	13.50	3.84***	14.50	10.05	0.92
Gr. 3 Control	36	15.89	10.17		6.76	7.11	
Gr. 4 Exper.	45	11.13	13.33	2.13	9.16	9.33	7.94*
Gr. 4 Control	18	10.56	14.83		7.72	5.78	
Gr. 5 Exper.	50	10.24	16.62	7.11*	9.85	8.58	0.09
Gr. 5 Control	23	6.91	12.09		10.78	9.26	
Gr. 6 Exper.	26	12.35	15.81	0.57	17.96	25.54	2.36
Gr. 6 Control	42	13.48	17.93		23.38	25.71	

* Significant at .01 level of confidence
** Significant at .05 level of confidence
*** Approaches significance at .05 level of confidence

statistically significant for the third and fifth grades, in favor of the experimentals in both cases. On the Incomplete Figures Test, the differences are statistically significant only for the fourth grade and this difference, quite interestingly, is in favor of the experimentals, reversing the trend observed for other measures at the fourth-grade level. This reversal trend also extends to the sixth grade where the difference is significant at about the ten per cent level of confidence in favor of the experimentals. These results suggest the possibility that the experimental conditions created in the fourth and sixth grades may have stressed elaboration and detail to the neglect of fluency and flexibility.

The Picture Construction Test was administered only in the first three grades and the results derived from these grades are presented in Table 6.6. It will be noted that the differences are statistically significant at the first and third grade levels, in favor of the controls in the first grade and of the experimentals in the third grade. It should be noted that there is a general tendency for less elaboration in the post-test than in the pre-test. In no group do we find any improvement.

Table 6.6

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Complexity (Elaboration) of Picture Construction Test, Grades One Through Three

Group	Number	Means Pre-	Means Post-	F-ratio	Level of Significance
Grade 1 Exper.	25	8.28	6.24	6.59	< .05
Grade 1 Control	47	6.72	6.64		
Grade 2 Exper.	44	8.96	7.26	0.07	Non-Significant
Grade 2 Control	21	8.57	6.81		
Grade 3 Exper.	22	7.43	6.76	4.88	< .05
Grade 3 Control	36	7.35	4.97		

Originality

Originality scores were obtained only for the three non-verbal tasks. The comparisons for Circles-Squares and Incomplete Figures are included in Table 6.7. Only in the fifth grade did the experimental

Table 6.7

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Originality Score of the Circles-Squares and Incomplete Figures Test, Grades One Through Six

Group	Number	Circles-Squares Test Means Pre-	Circles-Squares Test Means Post-	Circles-Squares Test F-ratio	Incomplete Figures Test Means Pre-	Incomplete Figures Test Means Post-	Incomplete Figures Test F-ratio
Gr. 1 Exper.	25	10.00	9.64	0.01	7.08	9.28	0.32
Gr. 1 Control	47	11.06	8.83		8.65	9.17	
Gr. 2 Exper.	44	13.48	15.14	0.02	9.24	10.87	4.23*
Gr. 2 Control	21	17.86	16.52		9.81	8.48	
Gr. 3 Exper.	22	19.50	17.36	2.19	7.32	11.00	0.54
Gr. 3 Control	36	15.72	11.94		8.52	9.95	

Table 6.7: cont.

		Circles-Squares Test			Incomplete Figures Test		
		Means			Means		
Group	Number	Pre-	Post-	F-ratio	Pre-	Post-	F-ratio
Gr. 4 Exper.	45	15.16	19.40	0.04	10.36	12.45	4.75*
Gr. 4 Control	18	12.00	18.67		7.33	9.67	
Gr. 5 Exper.	50	14.76	23.46	4.07*	10.31	12.31	0.25
Gr. 5 Control	23	9.17	15.96		7.70	10.91	
Gr. 6 Exper.	26	14.54	23.81	0.57	9.35	13.04	2.08
Gr. 6 Control	42	19.95	25.43		13.00	12.38	

* Significant at the .05 level or better

condition seem to produce a higher degree of originality on the Circle-Squares Test. The difference approached significance in the third grade, however. It should also be noted that the sixth grade experimentals also made a rather good showing on this measure, gaining an average of 9.27 points compared with an average gain of 5.43 for the controls. When post-test means were regressed to correct for pre-test differences, however, the difference failed to reach statistical significance. A similar phenomenon occurred at the second-grade level where the experimentals showed a gain of 1.66 while the controls were losing 1.34 points.

On the Incomplete Figures Test, the experimental condition seems to have made significant differences at the second and fourth grade levels, in both cases favoring the experimental condition. Again, the sixth grade experimentals made a good showing, gaining 3.69 points while the controls were dropping 0.62 points. Ten of the twelve groups showed some gains on this measure, however.

The results concerning the originality scores derived from the Picture Construction Test are shown in Table 6.8. It will be noted

Table 6.8

Comparison of Pre- and Post-Test Means of Experimental and Control Groups on Originality Score of Picture Construction Test, Grades One Through Three

		Means			Level of
Group	Number	Pre-	Post-	F-ratio	Significance
Grade 1 Exper.	25	1.48	1.68	2.09	Not Significant
Grade 1 Control	47	4.91	3.17		

Table 6.8: cont.

Group	Number	Means		F-ratio	Level of Significance
		Pre-	Post-		
Grade 2 Exper.	44	4.28	2.50	2.05	Not Significant
Grade 2 Control	21	3.24	2.90		
Grade 3 Exper.	22	4.00	2.19	1.62	Not Significant
Grade 3 Control	36	5.00	1.59		

that none of the differences are statistically significant and that post-test scores are uniformly lower than pre-test scores. Both of these findings may be an artifact of the inherent differences in the stimulus objects used in the alternate forms (triangle in the pre-test and jelly bean or curved shape in the post-test). Or, they may have resulted from deficiencies in the scoring procedure, since there are comparatively few common or unoriginal response categories in the pre-test.

Summary of Results

Since the evidence is rather strong that the abilities measured by the tests applied in this study are not of a unitary nature, it may well have been that some of the experimental teachers stressed one type of creative growth and not others. Thus, it may be useful to look at the results grade by grade.

Pupils under the experimental conditions in the first grade surpassed their peers under control conditions on the Circles-Squares fluency and flexibility and were reversed only on Picture Construction complexity or elaboration. One might infer that the first grade teacher in invoking the experimental manipulation emphasized fluency and flexibility of ideas to the neglect of elaboration, at least in non-verbal, figural media. The author would like to report that he observed in the classroom of one of the control first grade teachers some of the most outstanding creative work he has seen in the first grade over a period of six years of study of elementary school teaching for creative growth. Thus, our experimental teacher in the first grade was placed under exceptionally stiff competition.

In the second grade, the pupils in the two experimental classes surpassed their controls on Ask-and-Guess Test fluency and Incomplete Figures originality. In general, both the experimentals and the controls tended to perform less well on the post-test than on the pre-test. This observation is of special interest since all three of the third grade teachers expressed very low creative motivations and very strong critical and power or control motivations on the Personal-Social Motivations Inventory described in Chapter 4. This is an interesting contrast to conditions in the first grade where all three teachers expressed strong creative motivations and weak critical and power motivations and the predominant trend was one of creative growth in both the experimental and control classes.

In the third grade, the experimentals excelled the controls only on complexity or elaboration on both the Circles-Squares Test and the Picture Construction Test. In no case, were the experimentals surpassed by the controls. These data would suggest that the experimental third grade teacher interpreted creativity as "making things fancy" or more detailed and elaborate. In talking with teachers, we frequently find that they make this translation. Some of the validity studies now in progress are also indicating greater validity for the elaboration score than for other scores, where teachers' ratings of creativity are used as criteria.

There was a general tendency for the control class in the fourth grade to excel the experimental classes. The difference in favor of the controls was statistically significant for Circle-Squares fluency and flexibility. The experimentals, however, showed superiority on both complexity or elaboration and originality on the Incomplete Figures Test. Although the indications are not clear-cut, we might speculate that the fourth grade experimental teachers increased their emphasis on non-verbal, figural elaboration and originality to the neglect of fluency and flexibility.

The two experimental fifth grade classes showed more consistent gains than did the experimentals at any other grade level. Their superiority reached statistical significance on Circles-Squares fluency, Product Improvement fluency, Circles-Squares flexibility, Product Improvement flexibility, Circles-Squares elaboration, and Circle-Squares originality.

None of the differences were statistically significant at the sixth grade level. Throughout, there was a slight trend for the controls to show greater gains on fluency and flexibility and for the experimentals to make greater gains on complexity and originality. As already noted, the experimental sixth grade teacher experienced considerable conflict about the general idea of rewarding creative behavior. His creative motivation score was quite low and was accompanied by relatively strong critical and power motivations. On the other hand, the author observed some exceptionally good creative work in the classroom of one of the control teachers. This teacher reported having conducted a larger number of creative activities in the language arts than any other teacher in the school. Her creative motivation score on the Personal-Social Motivations Inventory was relatively high and her critical and power motivations were rather low.

Discussion

As a whole, the experience described and evaluated in this chapter is somewhat discouraging. This type of study is quite expensive when we stop to consider that it was necessary to test individually approximately 650 children in kindergarten through third grade on both a pre- and a post-test, making a total of about 1,300 individual test administrations. The scoring of a set of pre- and post-tests such as this is also a time-consuming and expensive operation. This makes it impossible to involve the large number of classes at each grade level needed to give the idea of in-service education for teaching for creative growth a fair chance. In fact, we would like even now to rescore all of the test records according to some of the newer scoring procedures which have been developed since this study was conducted. Thus far, however, we have been unable to raise funds which can be used for this purpose.

In retrospect we can see a number of ways in which we could have improved the study. One of the most important improvements might be in the quality of the in-service education experience. In this study, our big investment was in supplying the teachers with printed materials designed to stimulate ideas in the teacher for fostering creative growth. It might have been better to have supplied the experimental teachers with a set of materials which they could use to get started in the direction of different kinds of classroom behavior. We might have acceded to the requests of the teachers involved in this study to give them a checklist of creative activities to carry out in their classrooms. More time might have been spent under more favorable conditions in the group sessions with the experimental teachers. We tried both the lunch hour and an after-school period and found both to be far from ideal. We might have provided from our research staff substitute teachers who could have released the regular teachers to participate in these sessions. Demonstrations, a library of books and materials, practice in role playing, and creative problem-solving sessions might have been far more powerful than what was done in this study.

In another study to be reported in this volume, we pursued the alternative of giving teachers a wealth of specific suggestions in a specific curriculum area, language arts. More far-reaching, however, is the fact that our relative failure in this experience sent us off on some adventures in creating materials which teachers can use to get creative activities started and which hopefully cultivate in them attitudes more conducive to creative growth in children than we were apparently able to develop in the study described in this chapter.

Chapter 7

CREATIVE MOTIVATIONS OF TEACHERS AND CREATIVE GROWTH OF PUPILS[1]

Many educators believe that the motivations and attitudes of teachers have an important influence upon the mental and emotional growth of pupils. There have been few studies, however, that have given us much dependable information about what kinds of motivations and attitudes on the part of teachers affect what kinds of growth. The research problem is a complex and difficult one. Those who have made honest attempts to conduct such studies are usually overwhelmed by the complexity of the problem. Nevertheless, the few carefully-conducted studies which have been reported have been quite encouraging.

An example of a carefully-conducted study related to teacher attitude and pupil achievement is one by McCardle, using the Minnesota Teacher Attitude Inventory, a measure of teachers' attitudes towards children. McCardle's (1959) study involved 29 teachers and 1,643 pupils in first-year algebra. Teachers having the most favorable attitudes towards children, as measured by the Minnesota Teacher Attitude Inventory (MTAI), achieved significantly higher gains on quantitative thinking and functional competence in mathematics. There were no statistically significant differences in pupil means on the mechanics of elementary algebra. The teachers high on the MTAI were apparently not as "textbook bound" as the teachers falling into the low and middle groups on this measure. In other words, the pupils of the high MTAI teachers were better able to apply what they had learned in the solution of problems.

The complexity of the problem is reflected in a set of clues I derived from data collected by Yamamoto (1962). The 19 fifth-grade teachers in this study were administered a battery of the Minnesota Tests of Creative Thinking (Form D) and the California measures of Tolerance for Complexity and Theoretical Orientation. The pupils were administered the same test of creative thinking, before and after administrations of the Iowa Tests of Educational Development, and the Lorge-Thorndike Test of Intelligence, among other measures. It was thus possible to estimate over- and underachievement both in terms of expected level and expected growth as predicted by mental age. Pupils within a single school had been divided randomly among the fifth grade teachers of that school. In analyzing the data, Yamamoto had divided the pupils in the 19 classes roughly into thirds on the basis of their total scores on the battery of creative thinking tests. It is thus interesting to analyze the patterns of under- and over-achievement under different teachers for different types of pupils, such as the highly creative and the least creative.

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[1] The author gratefully acknowledges the assistance of Kaoru Yamamoto and Vincent Johnson in the preparation of this chapter.

One teacher in a particular school had the lowest score of any of the 19 teachers on the measures of theoretical orientation and tolerance for complexity. Her score on the test of creative thinking was also among the lowest of the group. Of the seven highly creative children in this teacher's class, five could be classed definitely as underachievers on the basis of their level of achievement and six of them could be classified as underachievers on the basis of gains in achievement during the five-month period of the study. All twelve of the children in this class having low scores on the creative thinking test overachieved on the basis of level of achievement and eleven of them overachieved in terms of gains during the five-month period of the study.

Another teacher in this same school ranked very near the top of this group of 19 teachers on theoretical orientation, tolerance for complexity, and creative thinking. By contrast, all four of the highly creative children in this teacher's classroom could be classified as overachievers. In other words, their Educational Quotients were higher than their Intelligence Quotients. However, ten of her twelve low creatives could also be classified as overachievers. My guess would be that this teacher with her tolerance for complexity, theoretical orientation, and creative thinking ability was able to assist both the highly creative child and the relatively uncreative child to grow mentally. The other teacher, lacking all three of these characteristics, was unable to help the highly creative children in her classrom to achieve their potentialities.

Although I have been unable to locate any carefully-conducted empirical studies of teacher motivations and attitudes and the creative growth of children, many observers have maintained that there are important relationships between these two sets of variables. Edith M. Henry (1953) contends that growth through art experiences requires teachers who have themselves experienced the thrill of creating something, who appreciate the creative work of others, who see the possibilities for creative experiences in day-by-day classroom living, and who maintain an atmosphere in which a child can make mistakes and be helped by others. Payant (1939) maintained that in order to foster creative growth in children an adult must have an attitude of experimenting, exploring, investigating, inventing, and otherwise inquiring. Barkan (1960) who studied intensively the creative art activities in selected elementary school classrooms likewise emphasizes this searching, inquiring attitude on the part of the teacher, an attitude which apparently results in or is at least accompanied by freedom, courage, independent thinking, and discipline on the part of pupils. For example, he describes an incident in which a teacher was talking with some girls working on a mural. It was clear that the teacher respected the girls' feelings and they knew she did. At the beginning of the discussion, the girls and the teacher clearly disagreed. The girls wanted to scrap their first attempt and the teacher tried to convince them otherwise. She told them what she thought and listened to what they had to say. Barkan reports that their reasons and feelings were sufficiently strong for the teacher to come to agree with the girls. In other words, she was willing to join with the girls in an inquiry which led to a change in her opinion.

A recent study by Wodtke (1963) further underlines the importance of the teacher's need or motivation to control children. Through observation techniques, Wodtke identified elementary teachers as high controlling or low controlling. He then compared the creative thinking test gains of pupils of high controlling teachers to those of pupils of low controlling teachers. He found that the pupils of low controlling teachers achieved higher gains on verbal creativity and the pupils of the high controlling teachers achieved higher gains on non-verbal elaboration. Wodtke concluded that a highly controlling teacher discourages self-initiated pupil talk, verbal creativity, and verbal flexibility, but tends to encourage increased detail, at least in drawings.

These observations and research findings are especially relevant to the study to be reported in this chapter, as many of the elements involved in the McCardle, Yamamoto, Henry, Payant, Barkan, and Wodtke studies are included in the rationale of the Personal-Social Motivation Inventory used as the measure of creative teacher motivation. It will be recalled from the discussion in Chapter 4 of this instrument that the creative motivation scale includes items which reflect an inquiring, searching, reaching-out, and courageous attitude. The critical motivation scale, on the other hand, reflects a controlling, censoring, inhibiting attitude. The power motivation scale, the other measure used in the present study, also reflects a controlling attitude. Experience has shown that there is almost a zero correlation between the scores on creative and critical motivations and a negative relationship between scores on creative and power motivations. In a factor analysis involving a variety of other personality variables, the creative motivation score loaded heavily in a factor including variables that represent a need to manipulate objects or artifacts through empirical analysis, reflection, and discussion; a restriving to overcome experienced frustration, failure, and humiliation; an intense, vigorous effort as contrasted to sluggish inertia; the giving of support to others by providing love, assistance, and protection; an interest in intellectual activity and problem-solving; and an introspective preoccupation with private psychological, spiritual, esthetic, or metaphysical experiences.

The major hypothesis to be investigated in the study described in this chapter is that the creative attitude of the teacher (as assessed by an index derived from the creative, critical and power scales of the Personal-Social Motivation Inventory) is related to the creative growth of their pupils.

Procedures

Data from two different studies are involved in this investigation of the role of the teacher's creative motivations in bringing about creative growth in pupils. In the study described in the preceding chapter, the participating teachers were administered the Personal-Social Motivations Inventory from which we derived a measure of creative motivation. This enabled us to study the relationship between the teacher's creative motivations and growth in general creative thinking ability over a period of approximately five months. Similar data were obtained from teachers participating in a study of growth in creative writing over a similar period of time.

Growth in General Creative Thinking Ability

Since the setting and the instruments have been described in detail in chapters 4 and 6, the procedures for the study of teacher motivation and growth in general creative thinking ability will only be reviewed here. All pupils in the 20 regular classes of a single elementary school were administered a test of creative thinking ability early in January and an alternate form of the test about the middle of May. Five of the ten teachers were placed randomly in the experimental group and given special in-service education concerning the role of rewarding creative thinking in producing creative growth. The other five teachers were asked to proceed according to their usual ways of teaching. The present analyses, however, are made without reference to experimental or control condition. This seems justified, since the effects of the experimental treatment were not especially strong and since the experimental and control teachers are about equally divided between the two criterion groups selected for this study.

One of the criterion groups might be called the creative motivation group and the other the critical-power motivation group. The index used in assigning teachers to these two groups was obtained by subtracting the Creative Motivation Score from the Critical Motivation and Power Motivation scores combined. The data for the primary teachers (first, second and third grades) are analyzed separately from those for the intermediate grade teachers (fourth, fifth, and sixth grade). In addition, we have also analyzed the data for four kindergarten classes. While it did not seem reasonable to include these data in the study described in Chapter 6 because the experimental teacher resigned and was replaced shortly after the study was initiated, it does seem appropriate to include them in the present analyses. The control teacher expressed a very strong creative motivation, while the teacher of the other class expressed strong critical and power or control motivations.

Growth in Creative Writing

In the study designed to assess the relationship of the teacher's creative motivation to growth in creative writing, pupils were asked to write an imaginative story first in February and then in May. In each case, pupils were offered a list of suggested titles involving an animal or a person with some divergent characteristic. They could choose from these titles or create a similar one of their own. The teachers participating in this study had been members of an in-service education group conducted by the author. The in-service education session involved the teachers in a consideration of ways for developing the creative thinking abilities through creative activities in the language arts. They were also given copies of the author's monograph, "A Collection of Ideas for Developing the Creative Thinking Abilities Through Language Arts." The teachers participating in the study all worked in the intermediate grades in a single school system. All teachers volunteered to participate in the study and to apply some of the ideas suggested in the monograph.

The subjects were administered the Personal-Social Motivation Inventory near the end of the study in May. On the basis of the creative motivation inventory, six teachers were identified as expressing strong creative motivations and six were identified as expressing weak creative motivations or strong critical and control motivations. This represented the total number of participants who completed the Personal-Social Motivations Inventory.

Results

Growth in General Creative Thinking Ability

A picture of creative growth as shown by the pre- and post-tests of general creative thinking ability can be obtained in a number of ways. A rough picture of this growth can be obtained by comparing the proportion of children who achieved gains as measured by the alternate forms described in Chapter 4. These comparisons are presented in Table 7.1 separately for the kindergarten, primary, and intermediate levels. It will be noted that in the kindergarten classes and in the primary grades a significantly greater proportion of the pupils taught by teachers with creative motivations made gains in their total creative thinking scores than did their peers taught by teachers who expressed weak creative motivations or stronger motivations to control and to correct. In the kindergarten classes the proportion is over twice as great under the teacher with a strong creative motivation as under the teacher with a strong motivation to control and correct. The differences are not statistically different at the intermediate grade level, however. It should be recognized that we are subjecting the kindergarteners and primary pupils to a more difficult test than we are the intermediate level pupils. This greater difficulty arose from the fact that the kindergarteners and primary pupils were administered the easier circles test as a part of the pre-test and the more difficult squares test as a part of the post-test. The reverse was true in the fourth, fifth, and sixth grades. Thus, it was easier for pupils in these grades to make gains. Nevertheless, the results are still strong

Table 7.1

Comparison of Proportions of Pupils Showing Gains in General Creative Thinking Ability Under Teachers with High and Low Creative Motivations

	High Motivation Teachers			Low Motivation Teachers			
Grade Level	Total Number	Number Gained	Per Cent Gained	Total Number	Number Gained	Per cent Gained	Chi-square
Kindergarten	58	39	67.0	58	18	31.0	16.85*
Primary	89	59	66.3	87	35	40.2	12.98*
Intermediate	93	74	79.5	110	95	86.4	1.66

*Significant at the .01 level of confidence enough to suggest that the creative motivation of the teacher may be more important in supporting creative growth in the kindergarten and primary grades than in the intermediate grades.

Growth in general creative thinking ability can also be studied by comparing mean pre- and post-test scores and mean gain scores. The method of covariance was employed for this purpose in order to correct for any initial differences in scores. The results of these analyses are presented separately for the kindergarten, primary, and intermediate grades in Table 7.2. It will be noted that there is a consistent tendency for the pupils of the creatively motivated teachers to show greater gains than the pupils of the teachers who expressed weak creative motivations or greater motivations to control and to correct than to inquire and behave creatively. In fact, in the kindergarten and primary levels, the pupils of the creatively motivated teachers showed overall gains while their peers taught by the less creatively motivated teachers actually showed slight losses. Except at the kindergarten level, all of these differences fall short of significance when covariance is applied and adjustments are made for pre-test differences.

Table 7.2

Covariance Analysis of Pre- and Post-Test Means and Mean Gains in General Creative Thinking Ability Under Teachers with High and Low Creative Motivations

	High Motivation				Low Motivation				
Grade Level	Number	Pre-	Post-	Gain	Number	Pre-	Post-	Gain	F-ratio
Kindergarten	58	33.1	40.3	7.2	58	36.9	29.0	-7.9	25.09*
Primary	89	86.4	94.0	7.6	87	110.4	106.2	-4.2	0.092
Intermediate	93	106.9	138.3	31.4	110	112.5	137.7	21.2	1.310

NOTE: The means for the three levels are not comparable since the batteries at each level varied somewhat. The same batteries were administered to all classes within each level.

* Significant at the .001 level

Growth in Creative Writing

Growth in creative writing was assessed by means of the composite creative writing score developed by Yamamoto. It will be recalled that this score takes into consideration such elements as organization, sensitivity, originality, imagination, psychological insight, and richness. The comparative data concerning the creative writing performances of the pupils of the six teachers expressing strong creative motivations with those of the pupils of the six teachers expressing weak creative motivations are presented in Table 7.3. It will be noted that the initial difference in means is not statistically significant. The pupils of the high motivation teachers made statistically significant gains while those of the low motivation teachers made slight, though insignificant, losses. When the phenomenon of regression was taken into consideration, however, the difference in gains was not statistically significant.

Table 7.3

Comparisons of Composite Creative Writing Scores of Pupils of Teachers Expressing High Creative Motivation with Those of Teachers Expressing Low Creative Motivation

Comparison	Number	Mean	t-ratio	Level of Significance
High Motivation, Pre-test	122	14.34	-0.1183*	Not Significant
Low Motivation, Pre-test	134	15.23		
High Motivation, Pre-test	122	14.34	2.1339**	.05
High Motivation, Post-test	122	16.02		
Low Motivation, Pre-test	134	15.23	-0.1863**	Not Significant
Low Motivation, Post-test	134	15.07		
High, Gains	122	1.68	0.1826*	Not Significant
Low, Gains	134	-0.16		

* Cochran-Cox test of critical value
** Student's t
Tests of homogeneity of variance met in all cases

Discussion

Admitting that the problem of studying the effects of teacher motivation on creative growth is a complex one and fraught with the hazards of many contaminating variables, the evidence presented in this chapter would appear to be strong enough to indicate that this variable has enough power to merit consideration and further study. Although some of the more rigorous statistical tests indicate that some of the observed effects may have been due to chance factors, much of the raw evidence is quite impressive. For example, when one goes through the tabulated scores pupil by pupil in the kindergarten classes one feels very strongly the impact of the difference, as child after child under the teacher with a weaker creative motivation than critical and control motivation show clear losses. The impact is still stronger if one examines the actual productions of the children. The loss in creativity can be sensed by almost any perceptive person. One does not experience this feeling in examining the pre- and post-test productions of the pupils of the teacher who expressed a strong creative motivation. It is interesting to note that this teacher was assigned to the control group in the basic study. We observed much outstanding creative learning in her classroom. By comparison, we had the feeling that the pupils in the classroom of the less creatively motivated teacher were subjected to a kind of sensory deprivation.

It is also perhaps not without significance that after six years of administering tests of creative thinking to elementary school children some of the research team's most memorable experiences occurred in the classroom of the kindergarten teacher who expressed strong creative motivations. Not one such memorable experience occurred in the room of the other teachers. Who could forget the little girl who, when told that there was only two more minutes for the Circles Test, drew a girl blowing soap bubbles? The unused circles all became soap bubbles. Then there was the thoughtful little boy who used fully four of his ten minutes on the Picture Construction Test to think before drawing a single line. I had shown how the gummed triangle could be used as the roof of a bird house with considerable elaboration. I then said, "Now, don't you draw a bird house like I did. This was just to show you one thing you can make." All of these kindergarteners except two began immediately to put their ideas on paper. One began working after about a minute's delay. The other sat in absorbed thought for at least four minutes. During this time I was anxious and only with difficulty restrained myself from going over to encourage him to get to work, to see if he understood what I wanted him to do, or otherwise find out what was wrong. Finally, a big smile came on his face and he went to work with much vigor. He had been thinking how a bird house would look on the inside and then attempted to draw what he had visualized. The teacher was absent on the day of the pre-test and was greeted the next morning by, "Gee, you ought to have been here yesterday. That man sure did work us hard but it was fun."

Perhaps another indicator of the differences between the two classes taught by the high creative motivation teacher and the low creative motivation teacher is to be found in the experiences of the photographer who was instructed to photograph in all four classes behavior that would illustrate creative ways of learning. He had no difficulty in obtaining rolls of pictures in the classroom of the creatively motivated teacher but was able to obtain almost no pictures which would illustrate creative ways of learning in the two groups taught by the other teacher.

Similarly, it seems to this investigator that we cannot pass off too lightly the fact that in some of the statistical analyses the pupils of the creatively motivated teachers showed significant growth while those of the less creatively motivated teachers actually showed decrements, though certainly not statistically significant ones. At any rate, it seems rather clear that little creative growth occurred during the period of these studies (approximately five months in one case and four months in the other) under those teachers who expressed comparatively more motivation to control and correct than to inquire and create, at least insofar as we were able to measure creative growth in this study.

Chapter 8

THE PRINCIPAL AND THE ENVIRONMENT WHICH VALUES CREATIVE THINKING[1]

Of the exciting personal accounts of creative teaching that I have read, the involvement of the principal has usually seemed to be critical. Natalie Robinson Cole (1940) credits her principal for giving her confidence in her own way of teaching. It was in a one-teacher school that Sybil Marshall (1963) dared to invent her unique and successful ways of teaching but she was fortunate in having an inspector who supported and recognized the worth of her innovations, even though those teachers the inspector brought to witness some of her work were not impressed. Sylvia Ashton-Warner (1963) was also supported by a sympathetic headmaster as she invented her original ways of teaching Maori children in New Zealand by means of her "organic" methods. Joan Goldman (1963) taught under the watchful eye of her rather forbidding Mr. Collins but he liked her results with children who were "backwards in reading."

Of the letters that I have received from teachers concerning their efforts to create conditions for creative growth among pupils, the discouraged ones complain that their efforts are critized or even forbidden by a principal. Those who are excited and positive almost always mention that they have the approval of their principals for some creative approach or that their principal has encouraged them in creative ways of teaching. One experienced teacher who had herself pioneered some interesting ideas in bringing about a more creative education and had authored a book on some creative approaches to the teaching of crafts was anxious that her principal *not* learn that she had been enrolled in my summer class.

These and other scattered clues make one wonder how powerful is the influence of the principal in determining whether teachers will carry out creative activities and whether pupils will show creative growth and participate in creative activities on their own. The two simple studies described in this chapter were designed to provide some tentative information concerning these questions. It would of course be quite beyond the power of an educational researcher to set up situations which would test in a rigorous manner hypotheses concerning the influence of the principal. Thus, we were fortunate in being able to study two situations which promised to yield data which might supply some empirical evidence concerning the problem.

Study 1: Principal-Involvement and Creativity in Language Arts

The Research Situation

The opportunity to study the role of the involvement of the principal in creativity in language arts arose in connection with a language arts workshop conducted by the author for a metropolitan school system as a part of its in-service education program. The workshop was attended in the late afternoon by fourth, fifth, and sixth grade teachers throughout the system. For participation in this program, teachers received points towards promotions. The elementary superintendent and his staff were heavily involved in the workshop and gave strong support in encouraging teachers to experiment with more creative approaches in the language arts. The principals were not involved in the workshop and there was no formal means of providing feedback information to the principal.

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[1] I was assisted in preparing this chapter by Victoria J. Punsalan and Kaoru Yamamoto.

A monograph discussing the nature of creativity in the language arts and describing a variety of specific suggestions for creative activities in the language arts was prepared by the author for use in the workshop. To set up a principal-involvement condition, it was possible to enlist the participation of the principals of two elementary schools, one a suburban school and the other a small town school, to use the monograph with their teachers. The principal of the suburban school did little more than distribute the monograph to his teachers while the principal of the small town school discussed the monograph with his teachers and had them administer Forms A and B of the Minnesota Imaginative Stories Test, to obtain a measure of growth in creative writing. It was my impression that the principal of the small town school genuinely favored a more creative approach to teaching, even though some of his teachers were definitely anti-creative in their attitudes. The principal of the suburban school admitted some misgivings about encouraging more creative approaches in teaching but I do not believe that he expressed these misgivings openly to his faculty.

Procedure

The workshop session on "Creativity Through the Language Arts" was opened by asking each participant to list on 5 x 8 cards all of the things they had done that day with their classes in teaching the language arts. They were asked then to specify the objectives they had tried to accomplish by using these activities. The activities and objectives which had been listed were then discussed in terms of the development of different kinds of mental functioning (cognition, memory, productive thinking, and evaluation). An analysis of the 57 specific objectives listed by the 22 workshop participants showed that 58 per cent of them were designed to bring about convergent or conforming behavior or thinking. About 25 per cent were classified as cognitive goals; three per cent, as memory goals; nine per cent, as divergent or creative thinking; and five per cent as evaluation.

After this, we discussed the creative thinking process and the creative thinking abilities and how they are involved in language arts achievement. Using the monographs which each participant had been given, we discussed each of the following kinds of thinking and the kinds of activities which might facilitate the development of each:

Ideational Fluency
Associational Fluency
Spontaneous Flexibility
Associational Flexibility
Originality
Sensitivity to Problems and Curiosity
Elaboration

Suggestions were offered for using the ideas included in the monograph. In addition, each participant was supplied by the Superintendent of Elementary Education with a portfolio of ideas for creative activities in elementary school language arts prepared and distributed by the National Council of Teachers of English (508 South Sixth Street, Champaign, Illinois).

The final activity of this two-hour session was a discussion of how to maintain a proper balance between emphasis on behavioral norms and creative behavior in the language arts. This discussion was centered around a consideration of how to talk with children who had written two different compositions. One contained no errors in spelling, grammar, punctuation, or sentence structure, but was dull and lacking in any real content. The other contained a variety of errors, was smudged and not neat, but was interesting, lively, and original in content.

Eleven of the 22 participants volunteered to take part in a study to determine whether the kinds of activities suggested in the monograph would lead to creative growth in writing during the ensuing four-month period (February, March, April, and May). During the next week, these eleven teachers were supplied materials for the pre-test and a control group of four teachers in another school system was established. At the same time, arrangements were made with the principals of the other two experimental schools to distribute the monographs to the fourth, fifth, and sixth grade teachers of their schools and for the pre-test to be administered to the pupils in the small-town school. During the latter part of May, pupils of the teachers involved in the study were administered the post-test and the teachers were asked to complete a checklist of creative activities in the language arts to determine the extent to which the suggested ideas had been applied during the four-month period.

Instruments

The instrument used in assessing creative growth was the Imaginative Stories Test described in Chapter 4. The instrument used to assess the extent to which teachers had conducted creative language arts activities and had applied the ideas suggested in the monograph was the "Things Done: Language Arts Checklist." This checklist includes the activities suggested and described in the monograph as ways of developing the creative thinking abilities. The items in the checklist as presented below will give the reader an idea of the contents of the monograph and of the extent to which teachers used each activity. The percentage figures are based on the responses of 50 fourth, fifth, and sixth grade teachers in the Twin Cities area.

Activity	Per Cent Reporting Activity
1. "Brainstorming" as a techniques for stimulating ideas, developing fluency of ideas, etc.	38
2. "Props" and "starters" such as a set of general questions to generate ideas or solutions	88

Activity	Per Cent Reporting Activity
3. Some specific set of questions to generate ideas	72
4. Practice in playing word games	64
5. Pupil invention of new words	32
6. Stories from varied arrangements of pictures	42
7. Pupil dictation of stories, ideas, etc. on a tape recorder or other electrical recording device	30
8. Competition to stimulate fluency of ideas	58
9. Stories based on two or more objects, concepts, etc	44
10. Regular role playing to stimulate spontaneity and naturalness of expression	38
11. "Competitive Team Role Playing" to stimulate fluency of ideas	12
12. Introduction to Roget's Thesaurus, some book of synonyms, or other word reference in addition to dictionary	22
13. Exercises in recognizing word relationships, words of similar meaning, words of opposite meaning, etc	98
14. Having pupils think of new uses for some device or project	44
15. Having pupils think of many alternative solutions to a problem	86
16. Writing the same message or story in several forms, for different audiences, for different effects, etc	18
17. Rewriting story or other composition to have opposite ending	30
18. Rewriting story or other composition in a different setting, with different characters, etc	20
19. Practice in writing unusual titles or captions for cartoons, pictures, news items, etc	52
20. Unusual natural events to stimulate ideas for creative writing	46
21. Creation of unusual events or situations to stimulate writing	42
22. Book reports in an original manner	70
23. Writing humorous stories, anecdotes, etc	72
24. Writing limericks, humorous verses, etc	58
25. Study of writings of humorists to study bases of humor	10
26. Film, picture, radio broadcast, TV program, or similar medium to stimulate original writing	52
27. Critical reading of comic books and suggestions for changes	10
28. Reading of stories and poems and suggestions of changes to make them more realistic, accurate, etc	34
29. Specific practice to develop keener observation through senses	56
30. Practice in creative listening, thinking how the speaker really feels about what he says	54
31. Expression of ideas and feelings stimulated by music	72
32. Expression of ideas and feelings stimulated by art experiences	72
33. Practice in drawing conclusions based on facts from several sources	48

	Activity	Per Cent Reporting Activity
34.	Writing original plays	34
35.	Recording pupils' discussion or other oral work on tape recorder and playing it back	36
36.	Having pupils find errors in facts, grammar, etc. in newspapers and similar sources	34
37.	Puppet or marionette show	20
38.	Illustration of stories or other writings with drawings	86
39.	Writing a book or carrying out some other sustained writing project	12
40.	Pupils worked out their ideas in some concrete, polished product (letter to be mailed, articles to be printed, etc.	88
41.	Pupils told entire stories through pictures, cartoons, photographs, drawings, etc.	42
42.	Exercises to improve ability to ask good questions	60
43.	Exercises to improve ability to make guesses from limited clues	42
44.	Reading to stimulate curiosity, question asking, etc.	62
45.	Encouragement of "idea-trap" habit for creative writings	0
46.	Having children keep a folder of their creative writings	50
47.	Having children evolve and test rules of grammar from readings	24
48.	Unusually difficult or even impossible problems to stimulate imagination	28
49.	Practice exercises or periods which "don't count" on grades	64
50.	"Writer's Corner," a quiet retreat where pupils can go to think and to work out ideas	10
51.	Special times occasionally for pupils to think	50
52.	Time for self-initiated learning	66
53.	Credit for self-initiated learning	56
54.	Definite tasks for identifying pupils with special talent in creative writing	38
55.	Special encouragement and guidance to pupils gifted in creative writing	66
56.	Special tasks for identifying pupils gifted in creative dramatics	28
57.	Special encouragement and guidance to pupils gifted in creative dramatics	26
58.	Other creative activities in language arts	28

Results

In all, responses were obtained from 20 teachers who had functioned in a situation in which the principal had not been involved and in which the valuing of creative behavior had not entered into the reward structure closest to the teacher. Responses were obtained from 18 teachers who had functioned in situations where the principal had been involved in the transmission of the ideas for developing creative thinking through the language arts activities. The mean number of activities checked by the teacher in the principal-involvement condition was 29.56

with a standard deviation of 7.78 compared with a mean of 25.15 by the teachers in the condition without principal-involvement with a standard deviation of 8.05. A t-ratio of 1.72 was obtained for the difference in means between these two conditions and is significant at between the .10 and .05 level. It is interesting to note that the mean for the four teachers in the control condition was 26.75, slightly higher than the mean of the teachers who volunteered to experiment with the ideas and experienced the stimulation of the monograph and the workshop session. This result might be interpreted as a small piece of evidence in support of the often-heard expression, "The best way to get experimental methods into practice is to place all teachers in a control group."

Complete pre- and post-test data were available for 102 pupils under control conditions; 155, under experimental conditions with principal-involvement; and 206, under experimental conditions without principal-involvement. Each story was evaluated according to the system developed by Yamamoto and described in Chapter 4. A comparison of the results obtained for the three groups is presented in Table 8.1. It will be noted that the gains achieved by the control group and the experimental group without principal-involvement are not statistically significant. Only the gains achieved by the pupils in the experimental condition with principal-involvement is statistically significant at the .05 level of confidence.

Table 8.1

Comparison of Mean Composite Scores on Pre- and Post-Tests of Creative Writing for Control Group and Two Experimental Groups, With and Without Principal-Involvement

Group	Sample Size	Means Pre-	Post-	Gain	t-ratio	Level of Significance
Control	102	14.28	14.63	0.35	0.7883	NS
Experimental, with Principal-Involv.	155	14.24	15.25	1.01	1.9804	< .05
Experimental, without Principal-Involv.	206	14.90	15.21	0.31	0.8777	NS

Each story was also scored for originality and interest according to the procedure developed by the author and described in Chapter 4. The comparison of the results obtained for the three groups are presented in Tables 8.2 and 8.3. It will be noted that pupils under control conditions failed to make gains on either the originality or the interest of their stories. The post-test stories, in fact, were rated as less interesting than the pre-test stories. The gains of both experimental groups on both originality and interest are statistically significant.

Table 8.2

Comparison of Mean Originality Scores on Pre- and Post-Tests of Creative Writing for Control Group and Two Experimental Groups, With and Without Principal-Involvement

	Sample	Means				Level of
Group	Size	Pre-	Post-	Gain	t-ratio	Significance
Control	101	4.19	4.07	-0.12	-0.7830	NS
Experimental, with Principal-Involv.	149	4.60	5.19	0.59	3.7396	< .001
Experimental, without Principal-Involv.	210	3.28	4.81	1.53	10.8101	< .001

Table 8.3

Comparison of Mean Interest Scores on Pre- and Post-Tests of Creative Writing for Control Group and Two Experimental Groups, with and Without Principal-Involvement

	Sample	Means				Level of
Group	Size	Pre-	Post-	Gain	t-ratio	Significance
Control	101	4.45	3.88	-0.57	-3.9437	< .001
Experimental, with Principal-Involv.	149	5.05	5.42	0.37	2.2534	< .001
Experimental, without Principal-Involv.	210	3.57	5.20	1.63	10.7923	< .001

When the mean gains obtained from each of the three measures derived from scoring the imaginative stories are analyzed by means of the Cochran-Cox test none of the results are statistically significant. It seems reasonable to assume, however, that if pupils under one condition show losses while those in another show significant growth that something of a meaningful nature is operating.

Summary

Although the evidence is not altogether convincing, there are indications that when there is principal-involvement in efforts to help teachers facilitate creative growth in language arts activities that teachers are freed to conduct and experiment with more such activities, and that their pupils show more creative growth in their writing of imaginative stories than when principals are not involved. Pupils under both experimental conditions, however, showed significant growth in the originality and interest manifested by their stories, whereas pupils under control conditions failed to show such growth.

Study 2: Principal-Involvement and Pupil-Initiated and Teacher-Initiated Creative Activities

The Research Situation

The opportunity for a second study on principal-involvement was presented when one of the authors of the manual on rewarding creative behavior described in Chapter 6 became one of the principals in a double-shift suburban school building. The second principal was interested in carrying out the study and actually held a rather favorable attitude concerning the role of creative thinking in elementary education but was not involved in promoting creative experiences within the school. Both principals were interested in observing the possible contagious effects on the afternoon pupils of the existence of creative activities and the products resulting from these activities during the morning session.

In this study we were interested in making a distinction between the creative activities which are stimulated or conducted in the classroom and those which take place outside the school. This distinction takes on special meaning when examined in relation to theories concerning the universality and strength of creative needs. Because of peer pressures and the school's emphasis on conformity to behavioral norms, some highly creative children appear to live "two lives," creatively speaking -- a dull conforming life at school and an exciting, creative one outside of school. The following description by Mearns (1958, pp. 49-50) of one of his pupils illustrates this phenomenon quite effectively:

> "This lad had been playing with words long before we became acquainted and was aware that he could fashion astonishing effects out of them; so he would not be one to give up his gift because of discouraging elders. To be sure he was still practicing in secret in those early days, for no teacher had ever become interested. His school exercises had required from him none of that fascinating game with words which would keep him up at night in sheer interest in the play; in fact, and this is the remarkable thing, I think, his school writings were dull, and certainly they were full of blunders; no one could have guessed from reading them that the author was a wonder-worker with words. So he lived two writing lives, as all ill-fated writing men and women have learned to do since Eve held her first dame school, one for the pedagogues, pale and undistinguished and one for his own hours, alive and really brilliant."

Subjects

The subjects of this study were 749 third, fourth, fifth and sixth grade pupils and 25 third, fourth, fifth and sixth grade teachers in a suburban elementary school operating on a double-shift schedule. Eleven of the teachers and 339 pupils constitute the experimental or principal-involvement condition and the remaining 14 teachers and 410 pupils, the control condition without principal-involvement in encouraging creative activities. Under both principals, the fifth and sixth grades were in session all day; all other grades were in session for only one-half day. The lower grades under the supervision of the involved principal met during the morning and those under the univolved principal met during the afternoon. All pupils and teachers were housed in the same building.

Procedures

The involved principal played a leading role in developing the manual entitled, Rewarding Creative Thinking, described in Chapter 6 and was quite anxious to lead his faculty towards a more creative kind of education. This principal in September supplied all of the teachers under his supervision with copies of this manual, discussed its contents with them, and encouraged them in its use in a number of ways, including weekly demonstrations by himself in various classrooms.

In February, the experimental teachers described incidents in which they had applied the principles of rewarding creative behavior described in Chapter 5. At this time, they were also supplied with copies of the monograph on developing creative thinking through the language arts and described earlier in this chapter.

In May, the 25 teachers were administered the 58-item check-list of creative activities in the langucge arts, also described earlier in this chapter in connection with Study 1. At the same time, the 749 third, fourth, fifth and sixth grade pupils in attendance on that date were administered a 100-item checklist of creative activities which they had done on their own outside of school. The activities included the areas of science, art, music, and social studies.

Results

Counting one point for each activity checked, a score was obtained for each teacher and each pupil. Means were obtained for the teachers and for the pupils separately for each grade. The results are presented in Table 8.4 along with tests of significance of the differences in

Table 8.4

Mean Number of Creative Language Arts Activities Reported by Teachers and Self-Initiated Activities Reported by Pupils Under Experimental and Control Conditions in Grades Three Through Six and Tests of Significance

Group	Experimental Number	Experimental Mean	Control Number	Control Mean	t-ratio	Level of Significance
Teachers	11	31.5	12	25.9	2.03	<.05
Third Grade Pupils	84	33.4	127	38.2	1.97	<.05
Fourth Grade Pupils	101	30.3	103	45.2	5.75	<.01
Fifth Grade Pupils	67	37.9	122	36.4	0.18	NS
Sixth Grade Pupils	87	37.9	58	51.4	4.73	<.01

means. As expected, the teachers under the experimental conditions (involved principal) reported having conducted more creative activities in the language arts than those under control conditions (uninvolved principal). Contrary to some predictions but in accord with the theory of the universality and strength of creative needs and abilities among children, there is a rather consistent tendency for pupils under control conditions to do on their own more of the creative activities included in the check-list than those under experimental conditions where they carried out more creative activities in school. The differences are statistically significant in the third, fourth, and sixth grades.

It will be noted that the means for the four grades in the experimental school form a curve which resembles quite closely those found in other schools for the creative thinking abilities and creative activities, that is, a drop between the third and fourth grades with rises in the fifth and sixth.

An extremely unusual phenomenon occurred in the fourth grade of the control school; the mean for the fourth grade surpassed that for both the third and fifth grades. These findings make us wonder if the out-of-school creative life of fourth grade pupils who have limited opportunity for creative activities in school might not be especially rich. It will be recalled that the fourth grade pupils in the control condition did not attend school during the morning. It will also be recalled that in the afternoons they occupied the same classrooms which the fourth grade classes under the experimental condition had occupied during the morning session. Thus, the products left behind by the morning session pupils may have served to stimulate curiosity and interest and the time available during the morning hours at home provided the time to carry out independent activities.

The following are some of the activities reported with significantly greater frequency by fourth grade pupils under control conditions than by their peers under experimental conditions at about the .05 level of significance or better with the percentages checking each:

Activity	Per Cents	
	Exper.	Control
Wrote a play	16	43
Kept collection of own writings	31	58
Produced puppet show	23	37
Recorded on tape recorder oral reading dialogue, story, etc	17	28
Found errors in fact or grammar in newspaper or other printed matter	26	53
Acted in a play or skit	70	86
Made up musical composition for some instrument	12	34
Made up new game and taught it to someone	62	76
Pantomimed some story	29	50
Acted out story with others	53	72
Made up an original dance	13	34

Activity	Per Cents	
	Exper.	Control
Played charades	32	58
Made wildflower collection	18	36
Made a musical instrument	17	41
Grafted a plant or rooted one from a cutting	13	36
Distilled water	7	29
Used a magnifying glass	64	81
Made leaf prints	27	46
Started a fire with lens	18	32
Collected insects	22	37
Collected rocks	74	90
Produced static electricity	14	48
Counted annual rings in a log	25	46
Organized or helped organize a club	42	64
Served as officer in a club organized by boys and/or girls	29	60
Figured out a way of improving something we do at home	39	59
Figured out a way of improving a game we play at home or school	35	52
Figured out a way of improving something we do at school	22	37
Found out the way some government agency (post office, court, etc.) operates	18	33
Wrote letter to children in another state	48	67
Made own decision about the use of money	45	73
Asked questions about the way some business operates	28	56
Made poster for some club or school event	28	57
Sketched landscape with pencil and/or charcoal	12	51
Designed stage settings for play or skit	12	28
Made and illustrated map of local community	10	23
Made plaster molds with which clay objects can be made	21	42
Drew cartoons	44	61
Designed greeting cards for some holiday or special event	54	68
Made animal figures in paper sculpture or papier-mâche	19	38
Made a soap carving	41	57
Made a basket for ornamental purposes	11	36
Made up a recipe for some kind of food dish	23	39
Made up a recipe for some kind of drink mixture	36	52

Although there were no statistically significant reversals (activities reported more frequently by the experimentals than the controls in the fourth grade), it is interesting to note those activities for which there is a slight reversal or almost no difference. These include such activities as the following: Used Roget's Thesaurus or some other book in addition to the dictionary, printed photographs, made a firecracker, kept a science notebook, kept a science scrapbook, designed a model airplane, wrote letter to children in another country, and made map of community.

A casual inspection of the results suggests that these fourth grade children who stayed at home during the morning hours were carrying out activities both alone and in neighborhood groups and doing things which can be done with relatively little adult guidance.

Discussion

Perhaps the most interesting finding of this study is the evidence which suggests that children exposed to a limited number of creative activities in school tend to compensate by undertaking a larger number of such activities of their own than do children who participate in a large number of creative activities in school. Such a finding supports the contention of some writers that there is in every child a strong need to be creative and that in some way he will find ways of satisfying this need. The stimulation of ideas from seeing the results of the creative activities of their peers and the availability of unscheduled time during the morning hours to explore these activities on their own apparently work together to provide ways of satisfying these needs. A number of alternative explanations might also be explored. We probably cannot credit directly the involvement or lack of involvement of the principal in encouraging teachers to conduct creative activities with these results. Quite likely it contributed to the total pattern of conditions responsible for the results.

Summary

In a double-session suburban elementary school, one principal supplied his teachers with copies of Rewarding Creative Thinking in September and copies of A Collection of Ideas for Developing Creative Thinking in the Language Arts in February and actively encouraged the application of the ideas presented in these manuals. No such involvement was displayed by the other principal. In May, the teachers of the third through sixth grades were administered a checklist of creative language arts activities which had been suggested in the manuals. At this time, pupils in the third through sixth grades in both sessions (339 pupils in the experimental and 410 in the control condition) were administered a 100-item checklist of creative and exploratory activities which they had done on their own.

It was found that the teachers in the experimental group (principal-involvement condition) reported having conducted a significantly larger number of creative activities in the language arts activities than did the teachers in the control group (non-involvement-of-principal condition). An opposite trend, however, was found regarding the number of activities the pupils reported having done on their own. Except in the fifth grade, pupils in the control school reported a significantly larger number of these activities than their peers in the experimental school. This tendency is especially marked in the fourth grade and provides some interesting clues to understanding the fourth-grade slump in creative activities and creative thinking abilities which seems to occur in most schools in the United States. It was suggested that the larger number of self-initiated activities of the children in the control school might serve as a compensating factor for relatively fewer creative activities in the classroom or that the creative activities of the experimental school may have had a contagious effect on the pupils in the control school.

Taken together the two studies described in this chapter give partial support to the idea that the involvement of the elementary school principal in supporting a creative type of education frees teachers to conduct a larger number of creative activities with the results that pupils show greater growth in creative writing. The support of top level or central administration and supervision may be necessary but is apparently less powerful than the involvement of the principal who is apparently seen as being more directly in the reward structure. Conducting a large number of creative activities in the classroom, however, does not guarantee that pupils will engage in a large number of creative activities on their own. The reverse may actually occur with the pupils themselves maintaining some kind of balance in defense of themselves.

Chapter 9

CREATIVE ACTIVITIES AND THE ENVIRONMENT WHICH REWARDS CREATIVITY[1]

Educators have for many years been puzzled over the problem of whether mental abilities are developed by the exercise of those abilities through appropriate activities. Binet (1909), for example, made his "mental orthopedics" an important part of the educational program for mentally retarded children. In days past, the inclusion of certain courses in the curriculum was justified on the basis that the mastery of these courses was good mental discipline. Mental abilities developed through such discipline could then be expected to function more effectively in solving difficult problems in "real life." Later, there developed a reaction against the mental discipline school of thought.

In recent concerns about the development of the creative thinking abilities many people have assumed that these abilities are developed through activities which provide opportunities for the cultivation of these abilities. In the light of the concerns of the present series of studies, we wondered if the power of a total environment which values creative behavior might not be greater than the power of creative activities themselves. We recognized, of course, that the provision of creative activities carries with it some implicit positive evaluation of creative achievement. Yet we knew that the attitudes of the teacher often communicated something that was quite different.

Let us review briefly the opinions and assumptions of some educators who have been concerned about this problem. Payne (1958), in discussing the teaching of mathematics to bright pupils, maintains that the ability to do creative work and creative thinking is dependent largely on the pupil's opportunities for creative work. He apparently includes also the environment which values creative achievement when he states, "A little encouragement by an inspiring teacher often helps a bright pupil to exhibit his potentiality for creativity" (Payne, 1958, p. 98). D. Flanagan (1959) maintains that the more creative acts we experience, whether they are our own or those of others, the better are the chances that we will behave creatively. He argues that perceptive poetry may stimulate the scientist and that a keen scientific insight into nature stimulates the poet.

One of the studies of the Union College Character Education Project (O'Brien, El[illegible] Putnam and Sewell, 1954) involving two- and three-year-olds showed that there was a significant relationship between an increase in the number of possessions available for dramatic and pretend play and an increase in the use of dramatic and pretend play. Children who were provided a larger number of media for imaginative play developed a greater enjoyment of creative imagination. It can, of course, be argued that parents who provide materials for creative play probably place a greater value on creative behavior than do parents who do not make such provisions for their children.

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[1] Kaoru Yamamoto and John E. Bowers prepared the basic data analyses for this chapter.

Also of importance in assessing the value of creative activities in developing the creative thinking abilities is the role of guidance. Markey (1935), who has studied extensively the imaginative behavior of preschool children, leans toward the view that more adult-directed imaginative activities and supervised creative activities might foster better the development of creative imagination than undirected freedom of action.

Although it has not been possible within the limitations of the power and financial resources available to this investigator to investigate directly the issues which have just been raised, three different situations with relatively high degrees of relevance have been studied. It is believed that these three situations yield some useful clues for understanding the roles of creative activities and an environment which values creative behavior.

Study 1: Creative Language Arts Activities

The Research Situation

The research situation is the same as the creative writing study described in Chapters 7 and 8. From Chapter 7, it will be recalled that the pupils of teachers having strong creative motivations showed statistically significant creative growth in their imaginative writing whereas the pupils of teachers having weak creative motivations showed small but not statistically significant losses in creative writing over a period of approximately four months. It was also found that teachers having strong creative motivations also reported having conducted a significantly larger number of creative language arts activities than their less creatively motivated peers. Our question now becomes: "Given the significant relationship between creative motivations and the provision for creative activities, do we still find a significant relationship between the provision of a large number of creative language arts activities and growth in creative writing?" Thus, a further analysis of the data described in Chapters 7 and 8 was made in terms of the number of different creative activities reported by the teacher during the creative writing project.

The pupils of those teachers whose number of different creative language arts activities placed them in the upper half of the distribution were called the High Creative Activity Group, while those in the lower half were called the Low Creative Activity Group. Eight teachers and 188 pupils constituted the High Creative Activity Group and nine teachers and 234 pupils made up the Low Creative Activity Group. In a few cases, it did not seem reasonable to make one or more of the evaluations under consideration, so there are slight variations in the number of cases reported from evaluation to evaluation.

Results

The data derived from the composite creativity score developed by Yamamoto and described in Chapter 4 are presented in Table 9.1. It will be noted that the slight gain registered by the pupils of the teachers who reported the larger variety of creative language arts activities is not statistically significant at the .05 level of confidence while that registered by their peers who presumably engaged in a smaller variety of creative language arts achieved a statistically significant gain. When the Cochran-Cox Test is applied to test the significance of the difference in mean gains, however, the t-ratio obtained is not significant at the .05 level.

Table 9.1

Comparisons of Mean Pre- and Post-Test Composite Creativity Scores of Pupils Under High and Low Creative Activity Conditions

Condition	Number	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
High Creative Activity in Language Arts	184	14.68	15.21	0.53	1.422	NS
Low Creative Activity in Language Arts	233	14.11	14.94	0.83	2.239	<.05

Note: Difference in mean gains not statistically significant (Cochran-Cox $t = 0.040$).

The number of words in each story was counted and the resulting comparisons are shown in Table 9.2. It will be noted that there are statistically significant gains in the number of words written by the pupils in both the high and low creative activity conditions. The analysis of the difference in mean gains, however, indicates that the pupils under the high activity condition achieved greater gains in number of words written than did those under low activity conditions.

Table 9.2

Comparisons of Mean Pre- and Post-Test Number of Words on Imaginative Stories of Pupils Under High and Low Creative Activity Conditions

Condition	Number	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
High Creative Activity in Language Arts	188	130.7	162.1	31.4	7.4301	<.001
Low Creative Activity in Language Arts	226	142.8	159.8	17.0	4.3941	<.001

Note: Difference in mean gains is significant at the .01 level of confidence ($t = 3.7425$).

Comparisons on the originality score developed by Torrance and described in Chapter 4 are presented in Table 9.3. Again, it will be observed that pupils under both high and low activity conditions made statistically significant gains. The difference in mean gains, however, is not statistically significant.

Table 9.3

Comparisons of Mean Pre- and Post-Test Originality Scores on Imaginative Stories of Pupils Under High and Low Creative Activity Conditions

Condition	Number	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
High Creative Activity in Language Arts	188	3.53	4.65	1.12	6.9829	<.001
Low Creative Activity in Language Arts	227	4.15	4.81	0.66	5.3097	<.001

Note: Difference in mean gains is not statistically significant (Cochran-Cox Test t = 0.1634).

Comparisons based on the interest score developed by Torrance and described in Chapter 4 are included in Table 9.4. It will be noted that the results are strikingly similar to those obtained for originality: both groups made significant gains but the difference in gains is not statistically significant.

Table 9.4

Comparisons of Mean Pre- and Post-Test Interest Scores on Imaginative Stories of Pupils Under High and Low Creative Activity Conditions

Condition	Number	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
High Creative Activity in Language Arts	188	3.77	4.71	0.94	5.5647	<.001
Low Creative Activity in Language Arts	227	4.53	5.11	0.58	3.1921	<.01

Note: Difference in mean gains not statistically significant (Cochran-Cox Test t = 0.1035)

In summary, it might be concluded that engaging in a larger variety of creative activities may result in greater growth in word fluency (as seen in the increased length of imaginative stories written) but that this does not guarantee greater improvement in the creative quality of productions (as seen in such measures as the composite creativity score, the originality score, and the interest score of the imaginative stories).

Study 2: Creative Activities from "An Experimental Training Program in Creative Thinking"

In Study 1, we had wondered if the failure of teachers to conduct a large number of the suggested creative activities might not have been due to the fact that so much was left to the initiative of the teacher. In both the in-service study reported in Chapter 6 and in the language arts study, a number of teachers had asked, "Why don't you give us some specific activities to carry out, some things that we can do and then check off?" While we believed that genuine creative growth was likely to take place only when the environment rewards creative behavior and that it is important for teachers to manifest consistently positive attitudes towards creative behavior, we decided that something of positive value might be achieved by giving teachers more specific exercises in a workbook type format. We recognized at the outset that we would not be able to "can" creative teaching. We hoped, however, that if we gave teachers materials which would give them support and enable them to begin conducting activities involving creative thinking that they would be able better to think up activities of their own.

R. E. Myers, at that time a teacher in the University of Minnesota Laboratory School and now a member of the College of Education faculty of the University of Oregon, had developed a number of exercises which he and other teachers had tested out with excellent results. These exercises were combined into a teacher's guide with additional suggestions for using them in meaningful ways under the title, "An Experimental Training Program in Creative Thinking," and later revised and published as "Invitations to Thinking and Doing' (Myers and Torrance, 1961b). These training exercises included materials for activities which involved: combining ideas and elements, exploring a variety of possibilities, seeing relationships, analyzing ideas, elaborating ideas, and becoming more sensitive and aware of the environment.

Although these and similar materials have been used since that time in a variety of kinds of experiments with results varying with the ways in which they are used, the idea in the study described herein was simply to determine what success fourth, fifth, and sixth grade teachers would have in using this experimental training program to bring about creative growth in writing imaginative stories.

Procedure

The elementary supervisors in two suburban school systems expressed an interest in testing the materials in their school systems and agreed to carry out the study. In System A, all teachers were asked to participate and agreed to do so. None of the teachers actually carried out enough of the activities to lead us to expect that any creative growth could have taken place as a result of the use of training materials. Thus, the pre-and post-tests and the pre- and post-imaginative stories were not analyzed. In System B, teachers were given the opportunity to volunteer their participation and an unexpectedly large number did so. In contrast to the teachers in

System A, almost all of the teachers in System B conducted enough activities to expect that creative growth might have taken place. Rather disappointingly, however, few of the teachers went beyond the bare exercises given in the teacher's guide and gave little or no evidence of letting one thing lead to another as we had hoped they would. (This led us to devise a different kind of format which has proven to be more successful in encouraging this kind of development.) For the analyses reported herein, a sample of 199 stories drawn randomly from the total number of stories submitted by System B was scored.

In the introduction to the manual, we indicated that we did not know whether such exercises could be used successfully in developing creative potentialities, as follows:

> "We don't know for sure that individuals can become more creative as a result of being involved in experiences designed to make them so. That is why you are being asked to help us conduct an experiment which may give some indication as to whether an individual's creative abilities can be enhanced through training."

We tried to stress the importance of the teacher's role in the following words:

> "As is always true in the classroom, the materials to be used in this experiment are no better than the teacher using them. However, it is earnestly believed that the exercises which were developed for this study are in no way the equal of an alert, imaginative teacher. The lessons really represent an attitude more than anything else -- an attitude that children should be encouraged to use their imaginations fully in exploring the wonders of human existence. For the desired results, this attitude must be shared by those using these materials."

In brief, the following study procedure was established for participating teachers:

1. Administer Form A of the Imaginative Stories Test using a 20-minute time limit. (Complete description given in Chapter 4.)
2. During the next six-week period try out at least ten of the 20 exercises given in the manual of guide, "An Experimental Training Program in Creative Thinking."
3. After six weeks, administer Form B of the Imaginative Stories Test, again using the 20-minute time limit.

It was explained to the teachers that they should feel free to select only those exercises which they felt would be most effective in their classrooms. No schedule of lessons was suggested, we explained, because we believe that the teacher can determine which exercises will fit in best with the activities and interests of his pupils and proceed according to the most promising plan. It was also explained that each lesson was designed as a springboard for further creative thinking, but that the amount of time which any of the exercises should consume must be left to the individual teacher. As it worked out in this study, however, a period of about 20 minutes was allotted to each exercise and there was apparently little or no opportunity for the exercises to lead to other creative activities and explorations, at least not in the classroom.

Criterion Measure

Since the key purpose of the study was to help children write with greater originality and get away from the obvious and commonplace, an attempt was made to develop and apply what might be a more discriminating measure of originality. This was done primarily by adding other elements to the originality scale described in Chapter 4. The rater was given a list of 23 characteristics to be judged on what amounts to a three-point scale, with the following guide:

> "If the writing manifests none of the quality under consideration, the judge assigns a value of "0." If the writing definitely and clearly manifests the quality being judged, he assigns a value of "2." If the quality under consideration comes through very weakly, is of poor quality, or is contaminated by the obvious and banal, he assigns a value of "1." The following qualities are included:
>
> 1. Unusual Title (catchy, unusual twist, surprising, reasonable synthesis of the contents)
> 2. Picturesque Speech (suggests a picture, is colorful, is strikingly graphic, is objectively descriptive, makes you see a picture, generates a definite image)
> 3. Vivid (liveliness, intenseness, stirs emotionally, vigorous, strong, fresh, spirited)
> 4. Flavor (has a noticeable, characteristic element or taste, appeals to sense of taste or smell)
> 5. Personal Element (author involves self, expresses personal feelings or opinions)
> 6. Original Solution or Ending, Surprising (usually has a punch line, but need not be funny; must be unexpected, unusual, surprising)
> 7. Original Setting or Plot
> 8. Humor (portrays the comical, funny, amusing, brings together incongruities, etc.)
> 9. Invented Words, Names, etc.
> 10. Individuality of Style
> 11. Becomingness (choice of words or expressions uniquely appropriate to characters and situations, fit as though author identified with characters, animals, etc.)
> 12. Imagination (fantasy, written as though the author is some character in history, literature, etc.)
> 13. Emotions or Feeling (writing itself expresses emotion)
> 14. Abstractive Element Consisting of Finding the Essence (skims off unessential words and ideas, selects the most appropriate ones)

15. Immediacy of Experience (direct relationship or closeness of writer to experience)
16. Curiosity (open-awareness to world; searching, inquiring quality)
17. Reservoir of Experimental Data (draws upon personal experiences)
18. Perceptive Sensitivity (shows sensitivity to people and to environment; uses analogy, metaphor, etc.)
19. Flexibility or Versatility (versatility of style and word usage, abandonment of cliche and worn-out simile)
20. Symbolism (uses symbols in a new, refreshing way)
21. Coherent Unity (refers to the structural or formative quality, synthesizes and brings into harmony diverse elements)
22. Expressive-Communicative Element (causes a mood, feeling, etc.)
23. Unique Punctuation, Capitalization (punctuation or capitalization used in unusual way to communicate idea, feeling, etc.)

(A somewhat more elaborate guide has been prepared and was used by scorers.)

Results

By applying the foregoing scoring system, a mean of 9.49 was obtained for the pre-test stories and one of 9.06, for the post-test stories. This slight decrease of .43 was found to be statistically not significant ($t = -0.956$). Thus, under the conditions described in the foregoing sections, engaging in creative activities or exercises was not accompanied by growth in the originality of the writing of the subjects. (It might be added parenthetically that these exercises have been revised and used in other experiments with positive results. In each case, however, the positive results can be explained on the basis of the way in which the exercises were used. It seems clear, however, that exercises alone do not guarantee creative growth.)

Study 3: A Larger Environment Which Values Creativity

Since the creation of a larger environment which values creativity is such a complex matter and involves such a complex of family, social, and community values, this investigator has searched in vain for a situation appropriate for study. At the time the project was initiated, negotiations were initiated with a system of private schools with a long and interesting history of dedication to the development of creativity in children. At first, leaders in this system were reluctant to participate in such a study, feeling that the introduction of measurement would do violence to the objectives which they sought to achieve, or would certainly not do them justice. About two years later, however, these leaders volunteered some of their schools for study. At that time, the deadline for the completion of this project had passed and there was no support available to conduct such a study.

Soon after the project was initiated and again two years later, it became possible to study creative growth in a situation which combined many of the features which the investigator considered essential to a larger environment which values creativity. It combined an expression of creative values on the part of the families and schools of the participants and of a variety of community resources. The research situation was provided by a seminar for senior high school students on "Man, Nature and the Arts" and co-sponsored by the Walker Art Center and the Center Arts Council.

The Research Situation

The "Man, Nature, and the Arts" seminar was an experimental program relating the arts and sciences for high school students in grades 10 through 12. The first of these seminars was begun in the fall of 1959 and continued through April of 1960. The second began in January 1962 and lasted through April of that year. The stated objective of the series of seminars was to increase the students' perception and understanding of the natural and man-made worlds. The series was opened with sessions on the mechanics of vision and visual perception, one conducted by an outstanding ophthalmologist and the other by an outstanding psychologist. Other sessions involved such topics as: "Selective Seeing -- Design in the Film," "Other Ways of Perceiving and Communicating: Music, Dance, Writing," "Man (Physiologically)," "Man, Sea, and the Air," "Men and Societies," "History of Architecture -- A Synopsis," "Objects for Man's Uses -- A History of Industrial Design," "The Artist and Society," "Art and the Consumer of Art," "Economic Factors Shaping Culture and Environment," "Minneapolis, Architecture and City Planning," "Design for the Individual and the Family," and "Planning the City and Region: Design for Society." Awareness and perception were consistent emphasis throughout the series. Most of the lecturers or session leaders are rather eminent in their own fields and were drawn from the University of Minnesota, the art and cultural institutions of the Twin Cities, and from the Minneapolis City Planning Commission.

The initial series was limited to a small, highly selected group. Participants were nominated by the schools in the Twin Cities area and final selections were made by the Children's and Education Committee of the Center Arts Council. The second series was less restricted in membership but certainly attracted highly creative youngsters. Small tuition fees were charged but a small number of scholarships or part-scholarships were available. Sessions began on Saturday mornings at 9:30 and continued until noon.

It was believed that this situation combined many of the features of a larger environment which values creativity: nomination by the school implies creative values on the part of the school, especially on the part of the teachers who nominated students or called the seminar to the attention of students; parental values were usually expressed by providing tuition fees, transportation to the Center, and willingness to permit or encourage youngsters to use their

Saturday mornings in this way; community values were reflected in the enthusiastic efforts of the outstanding lecturers who conducted the sessions; the lectures and discussions also highlighted the fact that societies also place a high value on creative achievements.

It was believed that an appropriate control group was not essential to the conduct of this study since the same test tasks had already been administered to a number of groups of high school students of similar status. For example, it had been found that under ordinary circumstances the experiences of one year of schooling do not result in an increase in measured creative thinking abilities at the senior high school level (Torrance, 1962a; Yamamoto, 1960). Thus, it did not seem too unreasonable to assume that significant growth in the measured creative thinking abilities of participants in the "Man, Nature, and the Arts Seminar" would be due to a complex of factors which might be labeled "a larger environment which values creativity."

Procedures

Soon after the beginning of each series of sessions, a battery of creative thinking tests was administered all participants present. Alternate forms were administered at the last session of the series in April. Participants in the first series were administered the Product Improvement Test, the Unusual Uses Test, the Circles Test, and the Ask-and-Guess Test. Participants in the second series were administered the Product Improvement Test, the Incomplete Figures Test, and the Sounds and Images Test of Originality. Twenty-four students were administered the pre-test in the first series but only eight were available for the post-test. Thirty-five were tested at the beginning of the second series and seventeen were available for the post-test. Unfortunately, the schedule of the post-test conflicted with various nationwide testing programs for scholarships, college admission, and the like, and it was not possible to arrange for the testing of all participants.

Results

As a group, the participants in both series of seminars achieved higher scores on the tests of creative thinking than any other educational groups which have been tested with these particular measures. The pre- and post-test means of the eight participants for whom we have complete data in the first series are presented in Table 9.5

Table 9.5

Mean Pre- and Post-Test Scores on a Battery of Creative Thinking Tests of Eight High School Students Completing Walker Art Center Seminar

Measure	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
Ideational Fluency	75.00	91.25	16.25	3.00	<.05
Flexibility	30.00	42.88	12.88	5.59	<.01
Originality	14.12	25.00	10.88	6.62	<.01

Table 9.5: cont.

Measure	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
Elaboration	13.38	18.25	4.87	3.43	<.05
Inventivlevel	48.63	64.50	15.87	2.42	<.05
Ask-and-Guess Test	20.88	29.62	8.74	3.41	<.05
Composite Creativity Score	202.00	271.50	69.50	5.77	<.01

together with tests of statistical significance. It will be noted that these participants achieved rather large gains on all of the measures. All of the subjects except one, in fact, gained on each of the subscores. This subject dropped sixteen points on ideational fluency but in spite of this disadvantage he achieved substantial gains in the quality of his thinking (flexibility, originality, elaboration, inventiveness, and the like).

The results obtained from an analysis of the performance of the seventeen students who completed the second series of sessions are shown in Table 9.6. It will be noted that only the gains for originality and elaboration are statistically significant. From this, we would infer that participation in this set of educational and cultural experiences did not make these youngsters more facile but that it gave them greater penetration and depth, as reflected in their significantly higher scores on originality and elaboration. On the Sounds and Images Test of Originality, these seventeen students achieved a mean of 30.3 on the pre-test and one of 41.1 on the post-test. This difference in means is significant at the .001 level of confidence ($\underline{t} = 7.475$).

Table 9.6

Mean Pre- and Post-Test Scores on Figure Completion and Product Improvement Tests of Seventeen High School Students Completing Walker Art Center Seminar

Measures	Means Pre-	Post-	Gain	t-ratio	Level of Signif.
Ideational Fluency	20.29	21.41	1.12	1.26	NS
Flexibility	12.47	12.00	0.47	0.48	NS
Originality	44.06	48.29	4.23	2.00	<.05
Elaboration	26.18	29.29	3.11	3.17	<.01

Conclusion

The situations investigated in this study were not ideal for providing firm information concerning the issues raised at the beginning of this chapter. Thus, any conclusions reached must certainly be accepted with reservations. In the author's opinion, however, the results do lend support to the idea that although creative activities or exercises may at times lead to creative growth, the provision of such exercises or activities does not guarantee creative growth. Other factors must apparently be present for such growth to take place. It is quite likely that one important condition is a "larger environment which values creativity."

Chapter 10

DIFFERENTIAL REWARDS FOR BOYS AND GIRLS

Educational research has shown repeatedly that people tend to learn and develop along whatever lines they find rewarding. Thus, it is reasonable to expect that sex differences in creative development and achievement can be explained in part by the differential rewards given boys and girls for specific kinds of behavior. While different concepts such as same-sex identification, conformity to same-sex norms, and the like have been employed in explaining sex differences in mental functioning, the role of differential rewards can be inferred from most explanations. Mussen and Conger (1956) chose the differential reward explanation in their textbook on child development and personality, although Mussen (1961) in a later study employs the same-sex identification explanation. In their textbook, Mussen and Conger (1956, p. 179) point out that boys are more likely to be highly rewarded for motor activities and as a consequence devote greater attention to manipulative and motor tasks than to language. Girls, they contend, are more likely to be rewarded for verbal accomplishments and thus make more progress in language development than boys. They point to data which show that even in infancy girls surpass boys in all aspects of language (onset of speech, vocabulary size, length and complexity of sentences, comprehensibility of speech, and the like).

Biological and Social Influences

A number of investigators (Sigel, 1962; Oetzel, 1962; Bosselman, 1953) have given attention to the difficulties involved in explaining observed sex differences and in determining the relative importance of

observed sex differences and in determining the relative importance of

biological and social factors. Bosselman (1953, p. 66) argues that the boy by virtue of his usually stronger muscular endowment and his more active sexual role seems predisposed to more aggressive characteristics. The girl is similarly predisposed to passivity. At the same time, she points out that from the earliest months of life the male child is pressured to become a typical boy, the female child a typical girl. Oetzel (1962) compiled a review of the literature on sex differences which shows that many of the assumed or claimed sex differences in mental functioning are not consistent from study to study. Of 27 studies on vocabulary differences, 16 reported no differences, four reported boys superior, and seven reported girls superior. In spelling, however, girls were superior in all of the reported studies. Of the reported studies in numerical reasoning, boys were better in ten, girls in only one, and no differences for seven. Sigel (1962) has discussed the difficulty in interpreting these studies and suggests that we examine the differences in the routes through which boys and girls attain a certain level of development, even though there may be no differences. He cautions against combining male and female samples, even when there are no statistically significant differences between them.

For many years, investigators of creative development have been concerned about the cultural influences which impinge upon the creative development of girls and women. In a study reported in 1924 by Stella Agnes McCarty, it was found that there is a narrowing tendency in the creative drawings of little girls. She suggested the need for greater effort in education to counteract a narrowing tendency in the early environmental influences in the interests of girls. She expressed the opinion that it might be well to divert interest somewhat from a preoccupation with domestic ideas such as dolls and housekeeping to a larger view. Osborn (1948) has pointed to the findings of the Johnson O'Connor Foundation in pioneering applications of a creativity test that women's creative talent on the average excelled that of men on the average.

Sex Differences in Cognitive Development

A number of rather thought-provoking findings concerning differences in the ways boys and girls learn and think can be found in the research literature. One interesting lead concerning the advantage usually attributed to girls in vocabulary development is found in a study by Robert Dykstra (1959) of beginning second-grade pupils. He found that by most measures girls outdistance boys in reading skill after only one year of reading instruction. Girls, however, did not surpass boys in identifying "untaught" words. These findings fit a general theory which holds that girls tend to learn better than boys when the learning is deliberate or by authoritative identification rather than by more spontaneous or creative ways of learning.

In a study of differences in the creative writings of boys and girls, Colvin (1902) found that the boys were superior to the girls in their general apperception of humor. The, were especially superior in the teasing, bullying, and farce comedy type of humor. They were inferior, however, in their apperception of the incongruous, the ridiculous, and the absurd, and of the more subtle and delicate forms of humor. Boys were especially superior in their ability to narrate a story with a point.

Many of the studies of problem solving have shown male superiority, even "intuitive" problem solving. One example of such a study was reported by Crutchfield (1960). In this study, two groups (179 experimental subjects and 199 controls) were tested on three puzzles requiring spatial reorganization. Immediately beforehand, the experimental subjects worked on three tasks involving spatial cues relevant to the puzzle solutions. The control subjects worked on similar tasks not involving such cues. The experimental subjects excelled the control subjects in percentage of solutions and this occurred without awareness of the relevance of the cues. This "intuitive" use of cues, however, was found in males only. Experimental and control females did not differ in the degree of success achieved in problem solving but the experimental males markedly surpassed male controls (e.g. 57 per cent solutions versus 37 per cent). A study by Hoffman and Maier (1961) yielded results favoring male superiority in problem solving. Over twice the percentage of men as women solved the experimental problem correctly. Furthermore, after discussion in groups of four, a significantly larger percentage of males than females changed from an incorrect to a correct solution. A study by Sommer (1958) favors male superiority in the retention of quantitative information. In this study, there were no statistically significant differences in remembering non-quantitative material. Although there was a tendency for the men to recall population and distance items better than women, the latter tended to perform better on items involving pints and teaspoons.

Educational Implications of Sex Differences

Our rather incomplete understanding of sex differences in mental functioning and development has continued to result in an unsatisfactory type of education for both boys and girls. Our culture has continued to have differential expectations for boys and girls and to reward them differentially for specific kinds of behavior. Yet we have generally insisted upon equality of boys and girls in education and that both sexes should be evaluated in school on the same kinds of achievement. Generally, we have been unhappy because boys lag in ability to read, spell, write, and the like and because girls are not interested in mathematics and science and are not as original as boys. A variety of proposals have been made for remedying this unsatisfactory state of affairs.

A sizeable number of educators, such as Maxwell (1960), have advocated that boys be kept out of school a year or two longer than girls. They support this recommendation by the citation of evidence that girls are the superior of boys in practically every area of development until they are well in their teens, specifically mentioning handwriting, verbal expression, vocabulary, muscular control, reading, and written composition. A number of other educators (Ginn, 1962), however, insist that the real difficulty arises from the fact that elementary education is designed for girls and that boys do not have a fair chance to learn in today's schools. They have recommended that boys and girls be separated for a part or all of the school day. An increasing number of experiments involving such separation are in progress in Virginia, Maryland, Florida, and other places. Actually, separate classes for boys and girls have been common for generations in some European countries, have continued to prevail in some cities in the "deep South," and are common among private schools in the United States. This segregation, however, has usually occurred because the sexes were being educated for different purposes or because one sex was thought to be distracting to the other. The segregation has rarely been designed deliberately to take advantages of developmental differences and differences in the ways in which boys and girls learn.

Neither of the two alternatives discussed above have been widely approved by educators. The following statement by Millie Almy of Teachers College, Columbia University, has been cited as representative of the attitude of professional educators (Ginn, 1962):

> "There are certainly many differences in the way boys and girls learn. There is a difference in reading rates, in physical maturity, and so on. However, there are also many differences within each sex. Why organize around one difference?

> "Also, it's true that the schools tend to be terribly female. All the literature and the lessons are much more geared to girls than boys. There are no male models for learning. But it seems to me that the answer is to improve the existing framework -- more individualized instruction to make up the differences, more male teachers to offset the women in school.
>
> "After all, men and women have to get along together in this world..."

The Concerns of This Investigation

The exploratory work which had preceded the larger project described in this volume suggested that by our differential rewards for boys and girls, especially in regard to their creative behavior, we place off limits or make taboo entire areas of experiencing. In so doing, it is only reasonable to expect that we thereby reduce their potentialities as human beings. It reduces their openness to experience and their contacts with their environments. Then, in spite of the fact that the culture makes taboo certain areas of experience for boys and certain other areas of experiencing for girls, the school expects and grades them on the same kinds of achievement.

In these early exploratory investigations it also seemed to us that we have some serious blind spots in our thinking insofar as education for potential is concerned. Almost everyone had conceded that boys in the second and third grades are inferior to girls in the second and third grades on practically every conceivable kind of intellectual performance and on many kinds of physical performance. Even our earliest experiences in testing children with tasks designed to elicit divergent thinking failed to support this contention, insofar as this kind of performance is concerned. From first through third grade, we found that boys become increasingly superior on most tests of creative thinking. By the fourth grade, however, we found that boys began losing their battle against conformity to behavioral norms and showed a sharp measured decrement in most of these abilities, especially if the test task requires that the subject express his ideas in words.

Among second and third grade boys (Torrance, 1963a), we found that the differences in favor of boys emerge even when stimuli inappropriate to the sex role of boys are used. For example, in one experiment three toys were used; a nurse's kit, a fire truck, and a dog. At the first grade level, girls produced more ideas than boys for improving the nurse's kit so that it would be "more fun to play with." Some of the boys stubbornly refused to think of ideas for improving the nurse's kit, while others first changed it to a doctor's kit and then suggested improvements. Boys produced more ideas than girls for improving the fire truck and there were scant differences between boys and girls on the stuffed toy dog task. By the third grade, however, boys were clearly superior to girls on this task, both in the quantity and quality (flexibility, originality, etc.) of their ideas for improving all of the toys, including the nurse's kit.

The superiority of boys over girls in creative thinking was also shown in a group task involving experimentation with science toys (Torrance, 1963a). Each group, composed of five members (two boys and three girls or three boys and two girls), was confronted with the task of discovering in the first thirty minutes how many things these toys could be made to do (both intended and unintended). In a second thirty-minute period, group members were given a chance to demonstrate what could be done with the toys and to explain their discoveries. At almost every level from second through sixth, boys demonstrated and explained more principles than girls. In the fifth grade, girls initiated as many ideas as boys in the initial period but demonstrated and explained fewer principles than the boys.

At the same time that boys are becoming increasingly more inventive and curious between the first and third grades, peer pressures against boys with clever and original ideas are apparently increasing. Girls appear to learn earlier than boys how to gain peer acceptance of their ideas and to avoid being labeled as having "silly" or "crazy" ideas. For example, we found in our exploratory studies that highly creative boys (as identified by tests) received about four times as many peer nominations as girls on each criteria as: "Who in your class has the most silly or wild ideas? Who in your class has the most ideas for being naughty?" Highly creative boys also tend to have a reputation among their teachers for having "a lot of wild ideas," but highly creative girls do not gain such a reputation. This state of affairs may stem from the fact that highly creative boys exhibit more uniqueness, inventiveness, and originality in their drawings and other productions than do highly creative girls. Highly creative boys compared with highly creative girls also tend to be less accessible psychologically and to have more internal tension.

It is the purpose of this chapter to examine evidence from several different studies or substudies in an effort to add to our understanding of how differential rewards for boys and girls operate insofar as their influence on creative behavior and creative growth are concerned. None of the studies cited may be regarded as a definitive attempt to solve the problems which have been posed in this chapter. In almost every case, the data were obtained for some other purpose. It is hoped that taken together these various pieces of evidence may push forward our understanding of differential rewards for boys and girls.

Who Is Rewarded When Teachers "Reward Creative Thinking"?

The Problem

In Chapter 5, we examined a variety of phenomena which occur when teachers are asked deliberately to reward creative behavior in the classroom. At that time, we did not examine the differential way in which teachers rewarded boys and girls under such conditions. In this section, the data described in Chapter 5 will be re-examined from this viewpoint. In general, evidence from many other studies indicate that girls excel boys on almost all of the kinds of behaviors which are rewarded by the school. If we ask teachers to reward creative thinking, does this help to balance somewhat the rewards given by the school? If so, would it then be appropriate to determine whether or not this motivates boys to achieve more of the conforming skills which the school already rewards? This question, however, must be left for further study.

Procedures

From Chapter 5, it will be recalled that teachers were asked to describe incidents in which they believed that they had rewarded creative behavior in the classroom. Prior to this, they had been given a copy of a manual prepared by the University of Minnesota Bureau of Educational Research, Rewarding Creative Thinking, and had been encouraged to do a more effective job of rewarding creative behavior than heretofore. Later, they were provided with a description of the following five principles or attitudes for rewarding creative thinking:

1. Be respectful of the unusual questions of children.
2. Be respectful of the unusual ideas of children.
3. Show children that their ideas have value.
4. Provide for periods of non-evaluated practice.
5. Help children see the consequences of their ideas and tie in cause and effect.

In their descriptions of the rewarded incidents teachers were asked to tell who initiated the behavior which was rewarded. In some cases, however, the sex of the initiator was not identified and in other cases the rewarded behavior was group rather than individual behavior.

Results

The results of the analyses of the data described above are presented in Table 10.1. From a comparison of the total number of reports

Table 10.1

Comparison of Frequency With Which Boys and Girls Are Named as Initiators of Creative Behavior in Reports of Teachers of Rewarded Creative Behavior

Principle	Total Reports	No. Sex Identif.	Boys Rewarded No.	Boys Rewarded %	Girls Rewarded No.	Girls Rewarded %	Chi-Square
Respectful of unusual questions	62	47	35	74	12	26	11.26*
Respectful of unusual ideas	96	46	36	76	11	24	12.52*
Pupil ideas have value	64	3	3	100	0	0	Not Tested
Unevaluated practice	96	49	30	61	19	39	2.47
Ideas have consequences	50	36	30	83	6	17	16.00*
Total	286	181	133	73	48	27	39.52*

*Indicates difference in proportion of boys and girls is significant at less than the .001 level of confidence.

and the number of reports in which the sex of the originator of the creative behavior, it will be observed that except in the case of the third principle it was possible to identify the sex in about 75 percent of the reports. There is a clear and consistent tendency for teachers to cite boys more frequently than girls when asked to describe incidents in which they have rewarded creative behavior. The overall difference is highly significant, as also are the differences for principles one, two, and four.

The writer makes no assumption that these reports represent an adequate sampling of the rewarding behavior of the reporting teachers. The teachers chose the incidents they described from all of the possible ones which they had experienced. Thus, we may assume that the incidents described represented some kind of salience to the teachers reporting them. These findings are offered only as an indication that when teachers are asked deliberately to reward creative classroom behavior, they mention boys more frequently than girls in describing incidents in which they have tried to reward such behavior. Thus, it is reasonable to infer that to some degree encouraging teachers to reward creative classroom behavior may balance somewhat the rewards which go to boys and girls in the classroom.

Differential Evaluation of Science Ideas by Peers

The Problem

From exploratory studies conducted by the author and his associates during the 1958-59 term, it became obvious that boys and girls themselves differentially rewarded or valued the ideas of boys and girls, especially in the area of science. It seemed from these exploratory experiences that in the early school years girls were developing attitudes, interests, and even disabilities which would make it difficult for them to make a healthy adjustment to a scientific world, much less become scientific discoverers. They were so reluctant to handle the science toys used in the laboratory-type experiment we were using that one would expect that they considered much of their world strange, incomprehensible, and unfriendly.

In this experiment involving science toys, many girls in the fourth through sixth grades shrunk from participation, saying, "I'm a girl. I'm not supposed to know anything about science." As a consequence, the performance of boys was significantly superior to that of girls on this task and the ideas of boys were valued more highly by both the boys and girls than were those of girls.

Thirteen months after the original study involving science toys, the experiment was replicated in the fourth, fifth, and sixth grades with an alternate set of science materials. During the conduct of the experiment it became quite obvious that a marked change had taken place among the girls in their response to the science toys. It is the purpose of the study described herein to compare the performance of boys and girls in a single school at two different points in time to determine whether the observed differences in attitudes are accompanied by improved contributions by girls and by a change in the differential evaluation of the ideas of boys and girls about science phenomena.

Procedures

Subjects. The subjects of the study were the pupils enrolled in the fourth, fifth, and sixth grades of a university elementary school during two school years, 1958-59 and 1959-60. Twenty-five children were enrolled in each grade and were divided into five groups of five each. In a few groups one member was absent at the time of the experiment, but no group consisted of less than four members. In both years, the study was conducted during the spring quarter near the end of the school year (April in 1959 and May in 1960).

In 1959, 34 boys and 36 girls participated; in 1960, there were 32 boys and 38 girls. The proportion of boys and girls was about the same in all classes and an effort was made to keep the ratio 2:3 or 3:2 in each group. Although there is a wide range of ability among the children enrolled in this school, there is a disproportionately large number of high ability children and children from professional families.

Experimental Procedures. In each class, all five groups were tested simultaneously, each in a different room under a trained experimenter. In an attempt to maximize motivation, prizes of interesting science books were offered for the best group or team performance. In the orientation, the terms "group" and "team" were emphasized. To simplify the recording of observations and the reporting of results, each subject was given a colored arm band and observations were recorded according to arm-band color.

Each group was provided a box of science toys and toy parts. In 1959, Science Toy Collection Number 2 of the Library of Science (59 Fourth Ave., New York 3, N.Y.) was used. This collection includes a sparkler, a finger trap, a pin trick, a four-ball puzzle, topsy-turvy top, a jumping top, a blow ball, a flying saucer, and nutty putty. To this collection was added a magnifying glass, a magnet, and a whistle. In 1960, Science Toy Collection Number 3 was used. This collection includes a bang gun, string telephone, siren, busy bee, calliope whistle, cat cry, tower of Hanoi puzzle, secret, Nim, square puzzle, something-for-nothing puzzle, and tetrahedron puzzle. In addition, a magnet and a magnifying glass were included.

Each group was given 25 minutes in which to explore and experiment to discover what could be done with the toys and toy parts and why they function as they do. It was emphasized that in addition to figuring out what each toy was intended to do they should try to think of other uses. Five minutes were then allotted for planning and organizing the demonstrations and explanations. The group then demonstrated and explained the principles which they had figured out. The time limit was 25 minutes. Finally, each subject was asked to rank each member of his group according to the value of his contribution to the group's success. In addition, in 1960, subjects were asked how well they enjoyed the activity and how well they thought their group would compare with the other four groups.

The experimenters tabulated on a specially prepared record sheet the number of ideas initiated by each subject during the exploratory phase and recorded all of the ideas demonstrated and explained during the subsequent phase. In addition, observations were made concerning how the group organized itself and got underway, how the members grouped themselves during the exploratory period, the general activity level, the roles developed by specific members, how the group planned the demonstrations, and the like.

Results

In 1959, boys were far ahead of girls on (1) ideas demonstrated and (2) scientific principles explained, averaging 6.18 and 4.65 respectively compared with 3.06 and 1.78 for girls. In 1960, the means for boys and girls were almost identical, 4.47 and 2.33 for boys and 4.34 and 2.11 for girls.

The analysis of variance data to test the significance of the observed differences in means are presented in Table 10.2. On ideas demonstrated and principles explained there is no significant effect due to year but there are significant effects due to sex and interaction.

Table 10.2

Analysis of Variance Data to Test Significance of Sex and Year Differences in Performance on the Science-Toy Task Among Pupils in Grades Four Through Six

Performance Variable	Sources of variance	Degrees freedom	Mean squares	F-Ratio	Level of signif.
Ideas demonstrated	Year	1	0.3491	0.35	NS
	Sex	1	93.7293	9.11	<.01
	Interaction	1	76.8551	7.47	<.01
	Error	136	10.2898		
Principles explained	Year	1	27.5973	3.28	NS
	Sex	1	85.1226	10.11	<.01
	Interaction	1	59.7176	7.09	<.01
	Error	136	8.4195		

It will be recalled that girls tended to go up and boys to go down on both of these measures.

We can now test the differences in means for boys and girls separately for each of the two years. These tests are presented in Table 10.3. It

Table 10.3

Tests of Significance of Differences in Means for Boys and Girls in 1959 and 1960 on Performance Variables of Science-Toy Task

Perfor-mance variable	1959 Means Boys	1959 Means Girls	1959 F-Ratio	1959 Level of Signif.	1960 Means Boys	1960 Means Girls	1960 F-Ratio	1960 Level of Signif.
Ideas demon.	6.18	3.06	13.09	<.01	4.47	4.34	0.03	NS
Princ. expl.	4.65	1.78	11.38	<.01	2.33	2.11	0.21	NS

will be observed that in 1959 boys demonstrated significantly more ideas and explained significantly more scientific principles than did girls. In 1960, however, the performance of girls does not differ significantly from that of boys.

Since girls contributed as much to the scores of their groups as did boys, it is of interest to know whether or not their contributions to the success of their groups was valued to the same extent as that of boys. Composite ranks were determined by adding the individual rankings and then ranking the totals. Table 10.4 presents a comparison of the composite rankings of girls and boys for each of the two years. It will be seen that in both years the contributions of boys are more highly valued than those of girls. There is no significant change in the rankings of boys or of girls between 1959 and 1960.

Table 10.4

Comparisons of Composite Rankings in Five-Person Groups of Boys and Girls for Value of Contribution to Success of Group on Science-Toy Task in 1959 1960[a]

	1959		1960	
Composite Ranking	No. Boys	No. Girls	No. Boys	No. Girls
First	13	2	11	3
Second	6	7	7	7
Third	7	10	6	10
Fourth	4	11	2	15
Fifth	4	5	4	3

[a] In some groups, there were ties and in some groups one member was absent and was not ranked.

Note: Chi square (Boys 1959 vs. Girls 1959) = 12.04; $p < .01$.
Chi square (Boys 1960 vs. Girls 1960) = 14.92; $p < .01$.
Chi square (Boys 1959 vs. Boys 1960) = 0.74; not significant.
Chi square (Girls 1959 vs. Girls 1960) = .20; not significant.

In 1959, it was quite apparent that many girls did not enjoy participation in the experiment, stating that it was not an appropriate activity for girls. In 1960, each subject was asked to indicate how much he enjoyed or disliked participation in the experiment. Responses were made on a five-point scale but only one subject (a boy) used the dislike end of the scale. It was found that girls reported as much enjoyment of the activity as did boys. In fact, what little difference there is favors girls.

It is also important to know how boys and girls value their own contribution. The rankings made in both 1959 and 1960 required subjects to include themselves (except in one group in 1959 when one experimenter failed to obtain this information). The self-rankings of boys are compared with those of girls for the two years by means of chi square. It was found that there is a consistent but not quite statistically significant tendency ($p \cong .10$) over the two years for boys to value their contribution to their group's success more highly than girls value theirs.

Discussion

From the data which have been reported herein, it seems clear that the reactions of fourth, fifth and sixth grade girls in the elementary school studied changed in significant and important ways during the period between April 1959 and May 1960. In 1959, boys demonstrated more ideas and explained more scientific principles than did girls. In 1960 in the same school, girls demonstrated as many ideas and explained as many principles as did boys. In 1959, many girls expressed obvious dislike for the science-toy task and tended to withdraw from active participation in it. In 1960, none of this dislike was observed. In fact, girls reported as much enjoyment of the task as boys did.

One aspect of the situation, however, has not changed. The contribution of boys to the success of the group continues to be evaluated more highly than that of girls. There is also a slight and almost significant trend for boys to evaluate their own contributions to the success of their groups more highly than do girls. In other words, cultural and/or subcultural changes seem to be making it more permissible for girls to participate in and enjoy tasks requiring creative scientific thinking, but the contributions of boys are still more highly valued by peers than are those of girls.

In trying to understand the reasons for the changes which have been described herein, several obvious facts should be mentioned. During the period in which the data were collected national interest was focused on the need for identifying and developing creative scientific talent. There is little doubt in my mind that attitudes in general have become more favorable towards science and scientists. It should also be reported that the author discussed with the teachers and parents of the subjects some of the results of earlier studies concerning sex differences in creative thinking. In these discussions, he assumed the position that there is misplaced emphasis or overemphasis on sex roles during the early school years and that this interferes with the development of the creative thinking abilities.

It seems clear that cultural emphasis on sex roles is a source of many conflicts for highly creative individuals and actually interferes with school learning and with the full development of children's creative potential. The high degree of sensitivity involved in creative thinking has a distinctly feminine character in our society; the independence required has a distinctly masculine character. Thus, the highly creative boy is likely to appear more effeminate than other boys his age and the highly creative girl is likely to appear more masculine than other girls her age. Pressures against such development may cause many children to sacrifice their creativity at an early age. These problems have also been discussed by Frank Barron (1957) and Anne Roe (1963).

In talks with parents, the author maintained that parents need to recognize that even though they might not want their girls to participate in the tasks of invention and scientific discovery, girls will still need to know much about the physical world. Thus, both boys and girls should be encouraged to talk, ask questions, seek answers, and experiment. There should be no discrimination between boys and girls in the explanations given about how things work. Girls should be taught to be as accurate and keen in their observations as boys. Their questions should be taken as seriously as those asked by their brothers. It is not necessary that this in any way interfere with the boy's learning to be a man and the girl's learning to be a woman.

Summary

In 1959 and 1960, a small-group task requiring creative scientific thinking was administered in the fourth, fifth, and sixth grades of a single elementary school. Alternate sets of science toys were used for the tasks and the experiments were conducted at approximately the same time of year (April in 1959 and May in 1960). The 25 members of each class were divided into five five-person groups and each group was tested in a separate room. Twenty-five minutes were allowed for the experimentation and exploration, during which observations were made concerning the initiation of ideas demonstrated and the number of principles. During this period observations were made concerning the number of ideas demonstrated and the number of principles correctly explained. At the end, subjects were asked to rank each member of the group, including themselves, on the basis of the value of their contribution to the group's success. In 1960, additional data were obtained concerning enjoyment of the tasks.

Results show that significant changes have taken place in the performance of girls on this task. In 1959, boys demonstrated and explained significantly more principles than did girls. In 1960, the performance of girls equalled that of boys. The contributions of boys, however, continued to be valued more highly than those of girls. Girls, however, reported as much enjoyment of the task as did boys. The tendency of boys to evaluate their own performance more highly than girls is consistent but does not quite reach statistical significance.

What Areas of Experiencing Are Off Limits for Boys and for Girls?

The Problem

If our culture rewards differentially specific kinds of behavior, it is to be expected that this will tend to place certain areas of creative experiencing virtually off limits for boys and certain other areas of experiencing off limits for girls. It is to be expected that this process will influence the kinds of creative activities in which boys and girls will engage on their own, with or without the encouragement of parents and teachers. It is the purpose of the writer in presenting the data which follow to provide some specific information about the differences in the creative experiencing of boys and girls, as reflected by their self reports of "things done on their own."

Procedures

The subjects of the study were the third, fourth and fifth grade pupils of a rather heterogeneous suburban school in the Twin Cities area. Data were available for 94 boys and 117 girls in the third grade, 93 boys and 90 girls in the fourth grade, and 93 boys and 99 girls in the fifth grade. These three grades were chosen because it was believed that children at these educational levels are subjected to rather strong social pressures to conform to sex norms and the differential rewards are rather powerful. It was also observed that children at these educational levels are usually given some degree of freedom in choosing what they do on their own.

In May, 1960, the subjects were asked to respond to a 100-item checklist of creative activities compiled by the author. The checklist included a variety of creative writing and speaking activities, dramatics, games, dances, scientific reading and experimentation or exploration, arts and crafts, special studies, and household activities. Subjects were given the following instructions in responding to the checklist:

> "You have been given a list of activities boys and girls sometimes do on their own. Indicate which ones you have done during this school term by checking the blank at the left. Include only the things you have done on your own, not the things you have been assigned or made to do."

Tabulations were made separately for boys and girls by grades. The differences in percentages between boys and girls were tested by using a standard momograph for estimating the level of confidence between differences in proportions (Zubin, 1939).

Results

The percentage of boys and the percentage of girls checking each of the hundred activities listed in the checklist are shown separately for each grade in Table 10.5. An asterisk (*) is used to indicate those activities checked by a significantly different percentage of boys and girls at about the .05 level or better.

Table 10.5

Comparison of Percentages of Responses of Boys and Girls on "Things Done on Your Own" Checklist in Third, Fourth, and Fifth Grades

Creative	Third Grade		Fourth Grade		Fifth Grade	
Activity	Boys(N=94)	Girls(N=117)	Boys(N=93)	Girls(N=90)	Boys(N=93)	Girls(N=99)
Wrote a poem	45	64*	56	69*	34	54*
Wrote a story	64	69	80	71	41	57*
Wrote a play	22	28*	20	36*	22	25
Kept a collection of writings	52	52	58	50	33	38
Wrote a song or jingle	46	47	32	41	24	36
Produced a puppet show	34	34	40	33	32	36
Kept a diary one month	16	18	16	29*	19	33*
Played word games	85	80	82	83	69	82
Used *Thesaurus* or similar	33	37	22	17	17	19

*Difference between boys and girls significant at .05 level

Table 10.5: cont.

Creative Activity	Third Grade Boys(N=94)	Third Grade Girls(N=117)	Fourth Grade Boys(N=93)	Fourth Grade Girls(N=90)	Fifth Grade Boys(N=93)	Fifth Grade Girls(N=99)
Recorded reading, etc.	39	33	31	28	37	26*
Found errors in print	32	31	37	38*	54	46
Acted in play or skit	65	67	94	79*	58	64
Organized play or skit	27	30	40	36	32	41
Made up and sung song	50	58	44	54	34	54*
Made up musical composition	28	27	19	27	19	27
Made up and taught game	69	67	83	74	59	69
Pantomimed some story	32	27	46	48	32	38
Acted out story	56	56	75	70	41	55
Wrote letter to family member	81	82	99	86*	66	92*
Made up original dance	22	48*	13	37*	13	41*
Played charades	31	31	53	50	50	52
Visited zoo	83	80	81	73	61	54
Explored cave	38	21*	48	21*	53	15*
Read science magazine	61	50	77	49*	69	47*
Read science book	79	63*	99	68*	69	49*
Mixed colors	86	77	91	81*	74	79
Made a fire-cracker	29	6*	26	4*	32	6*
Printed photographs	8	15	18	9*	8	10
Grew crystals	19	10	38	20*	19	9*
Made a leaf collection	39	49	53	49	46	41
Made wild flower collection	23	25	30	38	9	15
Made electric motor	14	1*	8	0*	27	3*
Made musical instrument	31	25	51	23*	24	19
Planned an experiment	53	49	72	39*	64	45*
Dissected an animal	36	21*	30	9*	23	11*

Table 10.5: cont.

Creative Activity	Third Grade Boys(N=94)	Third Grade Girls(N=117)	Fourth Grade Boys(N=93)	Fourth Grade Girls(N=90)	Fifth Grade Boys(N=73)	Fifth Grade Girls(N=79)
Grafted plant or rooted	30	18*	31	23	22	19
Distilled water	24	7*	22	14	7	5
Used magnifying glass	66	97	90	71*	76	67
Made ink	18	16	26	12*	32	15*
Made leaf prints	36	38	43	42	27	41*
Started fire with lens	28	5*	46	11*	44	24*
Used magnet	83	74	86	78	83	83
Raised rats, mice, etc.	39	28	42	28*	42	29*
Collected insects	46	23*	45	24*	37	18*
Collected rocks	81	78	97	81*	68	75
Kept weather record	11	12	22	10*	13	5
Been a bird watcher	43	34	41	44	26	31
Kept science notebook	16	14	22	11*	10	11
Kept science scrapbook	24	22	33	14*	18	6*
Attended science fair	22	18	41	40	42	36
Used chemistry set	54	19*	54	21*	66	23*
Produced static electricity	30	17*	43	20*	52	33*
Constructed model airplane	61	10*	90	11*	79	20*
Designed model airplane	46	8*	45	3*	49	11*
Counted annual log rings	21	15	47	32*	36	22*
Made stamp collection	36	35	49	33*	47	36
Made collection of postmarks	17	3*	13	10	20	6
Organized club	55	46	67	57	69	70
Officer in club	32	36	57	48	56	63
Improved game	46	38	57	51	29	41

Table 10.5: cont.

Creative Activity	Third Grade Boys(N=94)	Third Grade Girls(N=117)	Fourth Grade Boys(N=93)	Fourth Grade Girls(N=90)	Fifth Grade Boys(N=91)	Fifth Grade Girls(N=99)
Improved something, home	43	40	61	56	41	48
Improved something, school	38	27	44	33	13	17
Improved something, club	40	26*	49	36	39	34
Solved parental problem	35	42	57	41*	30	38
Solved peer problem	59	62	57	58	38	54*
Acted out historical event	21	14	28	16*	24	13*
Found out about local history	38	21*	53	24*	34	27
Found out about government	23	11*	38	23*	30	22
Wrote letter foreign country	33	24	35	49*	33	45
Wrote letter another state	41	39	61	68	51	69*
Made map of community	26	8*	48	41	26	19
Made decision on money	54	41	71	63	76	62*
Asked questions on business	42	37	52	41	44	42
Made poster	43	38	53	43	51	47
Organized sale, drive, etc.	17	17	40	21*	26	18
Sketched landscape	33	22*	35	41	31	31
Designed stage setting	23	25	22	22	23	29
Designed jewelry	20	15	18	15	4	14*
Designed cloth	19	15	24	16	13	22
Illustrated story	48	39	48	32*	27	33
Took color photographs	31	28	40	23*	41	29
Took black and white photos.	44	44	80	54*	67	74
Made illustr. map	12	8	19	16	12	5
Made plaster molds	32	25	43	41	30	20
Drew cartoons	51	33*	73	42*	72	57*

Table 10.5: cont.

Creative Activity	Third Grade Boys(N=94)	Third Grade Girls(N=117)	Fourth Grade Boys(N=93)	Fourth Grade Girls(N=80)	Fifth Grade Boys(N=93)	Fifth Grade Girls(N=99)
Designed greeting cards	50	64*	65	70	56	60
Made linoleum cuts	19	7*	23	11*	10	7
Made block prints	20	9*	28	11*	14	15
Made watercolor painting	36	38	51	52	38	42
Made oilcolor painting	33	32	43	48	38	49
Made paper animals	34	19*	40	40	33	32
Made toy for child	46	30*	59	42*	50	45
Built scale model	21	12*	12	13	17	12
Made wood carving	62	16*	76	22*	53	27*
Made soap carving	44	32*	58	48	56	63
Made ornamental basket	26	28	30	25	24	16
Plans for invention	15	10	25	11*	26	8*
Model of invention	14	0*	23	4*	29	4*
Food recipe	32	35	26	42*	24	31
Drink recipe	46	38	53	44	48	36

It will be observed that in the third grade 32 of the differences are significant at about the .05 level or better. Fifty of the activities show such differences at the fourth grade level and 35 of them show significant differences at the fifth grade level. The proportion of the activities showing statistically significant differences is greater at the fourth grade level than at either the third or fifth-grade level at about the .05 level of confidence. This would suggest that the differential rewards for various kinds of creative behavior increases greatly between the third and fourth grades and that the number of forbidden areas of experiencing is greater. This may help explain in some small degree the decrease in measured creative thinking ability between the third and fourth grades observed in a number of studies (Torrance, 1962a, 1963a).

At the third grade level boys appear to be more inhibited than girls in writing poems and plays, making up original dances, and designing greeting cards. Girls appear to be more inhibited than boys in exploring caves, reading science books, making firecrackers, making electric motors, dissecting animals, grafting or rooting plants, distilliing water, starting a fire with a lens, collecting insects, using a chemistry set, producing static electricity, constructing a model airplane, designing a model airplane, making a collection of postmarks, improving something in a club or organization outside the home or school, finding out about local history, finding out about the way government operates, making a map of the community, sketching a landscape, drawing cartoons, making linoleum cuts and block prints, making papier mâche animals,making toys, building scale models, making wood and soap carvings, and making models of inventions. Although the checklist makes no pretence at presenting a random sample of all possible creative activities children do on their own, an attempt was made to design a checklist which would be reasonably representative. Thus, we can place some small degree of confidence in the finding that a larger number of activities seem to be off limits for girls than for boys in the third grade. If further substantiated, this finding may help to explain why boys in the third grade tend to be more creative than girls according to most of the measures which we have thus far devised.

Fourth grade boys appear to be more reluctant than fourth grade girls to write poems and plays, keep diaries, make up original dances, write letters to someone in a foreign country, and make up original food recipes. The girls are more restricted than the boys in finding errors in print, acting in plays and skits, writing letters to family members, exploring caves, reading science magazines and books, mixing colors, making firecrackers, printing photographs, growing crystals, making electric motors, making musical instruments, planning experiments, dissecting animals, using a magnifying glass, making ink, starting a fire with a lens, raising rats and mice, collecting insects, collecting rocks, keeping weather records, keeping science notebooks and scrapbooks, using chemistry sets, producing static electricity, constructing and designing model airplanes, counting annual rings on logs, making a stamp collection, solving an interpersonal relations problem with parents, acting out historical events, finding out about local history and government, organizing a sale or drive, illustrating a story, taking color and black and white photographs, drawing cartoons, making linoleum cuts and block prints, making toys, making wood carvings, planning an invention, and making a model of an invention. It is also observed that more areas of experiencing also tend to be off limits for girls in the fourth grade than for boys. This raises some questions about the tendency for girls to forge ahead of boys on creative thinking tests in the fourth grade. It will be recalled, however, that almost all of these differences occur in group administered verbal tests where subjects must write out their answers. It does not occur with tasks such as the science toy test and individually administered, oral tests.

In the fifth grade, boys appear to be more resistant than girls to writing poems and stories, keeping a diary, making up and singing songs, writing letters to family members away from home, making up original dances, solving problems with peers, making leaf prints, writing letters to someone in another state, and designing jewelry. Girls in the fifth grade are more likely than boys to block out such areas of experiencing as making a recording, exploring caves, reading science magazines and books, making firecrackers, growing crystals, making electric motors, planning experiments, dissecting animals, making ink, starting fires with a lens, raising rats and mice, collecting insects, keeping a science scrapbook, using chemistry sets, producing static electricity, constructing and designing model airplanes, counting annual rings on logs, acting out historical events, making decisions on money, drawing cartoons, making wood carvings, and making models of inventions are more attractive to boys than to girls at all three levels. In some cases, third-grade children are more likely to engage in an activity which tends to be off limits for their sex than are older children. For example, third grade girls are more likely to dissect an animal than their older sisters while a third grade boy is more likely to make up an original dance than are his older brothers.

In summary, it does seem to be true that certain areas of creative experiencing tend to be off limits for girls while others tend to be off limits for boys. In general, creative experiencing through writing is more open to girls than to boys but certain kinds of creative writing experience are more open to boys than to girls. Similarly, there is a general tendency for creative experiencing through nature and science to be less open to girls than to boys, but certain areas of experiencing in nature and science are more open to girls than are other areas.

Although the differences found in this study may not hold in all cultures, it is believed that these data can supply useful cues to parents and teachers in keeping open to both girls and boys a larger number of areas of creative experiencing.

Do Boys and Girls Perceive Certain Occupations as Off Limits?

The Problem

If boys find that there are social pressures which tend to place certain childhood creative experiences off limits for them and if girls find that these pressures tend to place certain other activities off limits for them, it is reasonable to expect that both sexes will perceive certain occupational goals as off limits for them. During the past few years the National Science Foundation and other similar organizations have been concerned that so few women choose science careers. Generally, their investigations have led to the conclusion that women shun science careers because American society regards science work as traditionally male. The various reports which have been issued on this problem urge full use of all available scientific talent, including women. Generally, the roots of the problem have been traced to the high school and the colleges where girls are discouraged from taking science courses. It has also been pointed out that many women's colleges do not even offer adequate science courses. Seldom, however, has anything been said about the earlier roots of sex differences in vocational choice.

The purpose of this section is to present data from a larger exploratory study of the vocational choices of children which might throw some light upon the problems created by placing certain experiences and certain occupations off limits for one sex rather than another.

Procedures

As a part of the administration of tests of creative thinking, information has been obtained concerning the vocational choices of children and young people from first grade through college. Since the samples thus far obtained for the primary grades and the high school and college years are not yet adequate, attention will given only to the data for the fourth through the seventh grades, the years critical to our concern in this chapter. In all cases, total grade or school populations have been included. The samples were drawn from Minnesota, Michigan, North Dakota, California, Illinois, South Carolina, North Carolina, and New York. In the fourth grade, data were obtained from 1,228 children (643 boys and 585 girls); in the fifth grade, 749 children (375 boys and 374 girls); in the sixth grade, 2,225 (1,146 boys and 1,079 girls); in the seventh grade, 473 subjects (221 boys and 252 girls).

Results

Table 10.6 reports the percentage of boys and percentage of girls choosing each of the 23 most popular occupations for subjects from the

Table 10.6

Most Popular Occupational Goals Expressed by Boys and Girls in Grades 4-7

Occupational Goals	Fourth Gr. Boys N=643	Fourth Gr. Girls N=585	Fifth Gr. Boys N=375	Fifth Gr. Girls N=374	Sixth Gr. Boys N=1146	Sixth Gr. Girls N=1079	Seventh Gr. Boys N=221	Seventh Gr. Girls N=252
Actor, actress	0.5	1.4	0.5	2.1	0.3	1.9	0.9	0.8
Air hostess	0.0	4.6	0.0	4.5	0.0	2.3	0.0	3.6
Artist, cartoon	2.0	2.7	2.4	1.1	2.1	2.8	1.4	3.6
Athlete, prof.	12.9	0.2	8.3	0.0	9.1	0.3	8.1	0.0
Barber, beautician	0.3	1.2	0.0	0.5	0.2	3.0	0.0	3.0
Carpenter	2.3	0.0	2.1	0.0	2.1	0.0	2.3	0.0
Engineer	5.9	0.0	6.7	0.0	7.8	0.1	10.0	0.8
Farmer, rancher	3.7	1.2	9.1	1.9	4.8	1.3	6.8	2.0
Housewife, husb.	0.0	8.5	0.1	6.7	0.1	7.1	0.0	5.6
Lawyer	3.3	0.3	2.7	0.0	4.8	1.6	3.6	0.8
Mechanic	3.0	0.0	1.9	0.0	3.2	0.0	4.1	0.0
Medical doctor	6.1	1.0	10.1	3.2	11.3	4.9	8.6	3.6

Table 10.6; cont.

Occupational Goals	Fourth Gr. Boys N=643	Fourth Gr. Girls N=585	Fifth Gr. Boys N=375	Fifth Gr. Girls N=374	Sixth Gr. Boys N=1146	Sixth Gr. Girls N=1079	Seventh Gr. Boys N=221	Seventh Gr. Girls N=252
Military	7.2	0.0	6.7	0.0	4.4	0.4	4.5	0.8
Minister, etc.	1.6	2.1	2.1	4.0	1.5	2.0	2.3	2.8
Musician	0.8	0.9	0.3	2.4	1.0	1.4	1.8	1.6
Nurse	0.2	29.6	0.0	27.5	0.1	22.1	0.0	21.0
Operator, truck	3.1	0.2	3.2	0.0	2.2	0.0	2.7	0.0
Pilot, astronaut	6.7	0.0	5.3	0.0	3.8	0.1	3.6	0.0
Police detective	3.3	0.3	5.1	0.3	3.1	0.5	2.4	0.4
Scientist	9.3	2.1	9.1	3.2	6.0	2.3	9.0	2.4
Secretary, etc.	0.0	4.1	0.0	8.3	0.0	8.2	0.0	12.3
Teacher	2.3	31.5	1.0	32.1	3.2	27.5	2.3	27.4
Undecided	10.3	6.8	10.1	6.1	10.6	5.9	22.6	8.3
Veterinarian	2.6	3.8	2.4	1.3	2.9	2.3	2.7	2.4
Other occup.	56	26	31	14	53	36	30	23

fourth through the seventh grade. In many occupational areas, it is rather obvious that children accept the "off limits" signs for their sex. Engineering, professional athletics, carpentry, law, mechanics, military occupations, operation of trucks and heavy equipment, piloting and space travel, and police detective work are almost excluded by girls in their choice of occupational goals. Similarly, boys almost totally exclude consideration of such occupations as nursing, air hostess or steward, barber or hair stylist, and secretarial work. The differences are rather sharp (in most cases, significant at better than the .05 level of confidence) but not so extreme in boys' rejection of teaching and girls' rejection of science, medicine, and farming. It is interesting to note that young girls find acceptable goals for science and medical interests in veterinary medicine but the older girls reject choices in this area. This may be made possible by society's approval of girls having and caring for pets.

Although there is a general rejection of what are recognized as some of the more creative occupations, sex differences do not appear to be great. Girls tend, however, to choose more frequently than boys such occupational goals as acting, the visual arts, fashion designing, religious occupations, interior decorating, music, linguistics, library work, dancing, and writing. Boys appear to hope for creative outlets through some of the more adventurous occupations such as explorer, clown, hunter, archaeologist, cartography, inventor, skin diver, diplomat, racer, and the like. Some rare girls, however, expressed interest in such adventurous occupations as espionage, archaeology, animal trainer, criminology, and the like.

In summary, it seems clear that at least by the time children reach the fourth grade, and perhaps earlier, they have come to perceive certain occupational goals as being off limits for them because of their sex. It seems likely, for example, that if we want girls to be open to the consideration of science careers, this type of vocational guidance must be initiated long before the high school years.

How Do Differential Rewards Affect the Manipulative and Reading Activities of Children?

The Problem

There are doubtless many areas of motor, mental, emotional, and spiritual experiencing that are affected by the differential rewards given boys and girls for specific behavior. Manipulative and reading activities have been chosen as examples of kinds of experiencing which may be expected to affect creative achievement.

Investigators in the field of creativity have long given attention to the role of manipulativeness in invention, scientific discovery, and the like. Rossman (1931) in his study of the psychology of inventors assigned an important role to manipulative tendencies in inventiveness, but offered little or no empirical data in support of his contention. He maintained that an irresistible tendency of manipulation and exploration of objects begins at an early stage and is probably the basis of curiosity and playfulness. He thus argued that manipulation supplies much of the necessary experiences for the development of creative imagination. The studies of Barron (1958), Stein (Quillian, 1957), and others also support this contention.

In one of my own studies (Torrance, 1963a), it was also shown that children who do the most manipulation of objects while trying to produce ideas for improving those objects succeed in producing a larger number of ideas and a higher quality of original ideas than those who do little or no manipulation. Data will now be presented relative to male-female differences from this study.

Procedure in Manipulation Study

The subjects of the manipulation study were first, second, and third grade pupils enrolled in two elementary schools. Systematic recordings were made of observations concerning the behavior of 68 first graders, 62 second graders, and 82 third graders.

Observations were made during the individual administration of the Product Improvement Test, involving three different toys (nurse's kit, fire truck, and stuffed toy dog). Three categories were used in classifying the degree of manipulation. Those who did not handle the toys at all were placed in the "Low" category. Those who manipulated one or more of the toys to some degree but not to a high degree were placed in the "Moderate" class and those whose manipulation of the toys was described by the examiner as "considerable," "extreme," "excessive," "high degree" and the like were rated in the "High" category. Chi-square analysis was used in order to study sex differences in manipulative tendencies.

Results of the Manipulation Study

Although it was found (Torrance, 1963a) that the degree of manipulation is clearly related to the number and originality of the responses produced, this is not our concern at the present time. To study any differential behavior of boys and girls, the number of boys and girls engaging in each of the three degrees of manipulation at each grade level are shown in Table 10.7. It will be seen that differences in the first grade are not statistically significant. By the second grade, greater manipulative tendencies are found among boys than among girls. By the third grade, these differences have become quite marked.

Table 10.7

Number of First, Second, and Third Graders Engaging in Varying Degrees of Manipulation for Boys and for Girls and Chi-Squares

Degree of Manipulation	Boys 1st Gr.	Boys 2nd Gr.	Boys 3rd Gr.	Boys Total	Girls 1st Gr.	Girls 2nd Gr.	Girls 3rd Gr.	Girls Total
High	5	11	11	27	4	6	5	15
Medium	16	16	24	56	17	16	20	53
Low	12	2	1	15	14	11	21	46
Total	33	29	36	98	35	33	46	114

Note: Chi-square (Boys) = 18.7208; df = 4; p <.001
Chi-square (Girls) = 1.7698; df = 4; p, not significant
Chi-square (Overall) = 20.4906; df = 8; p <.01

In Table 10.8, the same data as presented in Table 10.7 have been rearranged to show differences from grade to grade among boys and among girls separately. It will be observed that the tendency for boys to become more manipulative in the test situation increases steadily and significantly from grade to grade from the first through the third grade. No such tendency exists among girls.

Table 10.8

Number of Boys and Girls Engaging in Varying Degrees of Manipulation in the First, Second, and Third Grades and Chi-Square

Degree of Manipulation	First Grade Boys	First Grade Girls	First Grade Total	Second Grade Boys	Second Grade Girls	Second Grade Total	Third Grade Boys	Third Grade Girls	Third Grade Total
High	5	4	9	11	6	17	11	5	16
Medium	16	17	33	16	16	32	24	20	44
Low	12	14	26	2	11	13	1	21	22
Total	33	35	68	29	33	62	36	46	82

Note: Chi-square (First Grade) = 0.2365; df = 2; p, not significant
Chi-square (Second Grade) = 7.4742; df = 2; p <.02
Chi-square (Third Grade) = 19.8715; df = 2; p <.001
Chi-square (Overall) = 27.5822; df = 6; p <.001

If we consider the data in both Tables 10.7 and 10.8, it looks as if the pattern of manipulative behavior for girls is the same from grade to grade but that boys differ from grade to grade, and that boys and girls are alike with respect to manipulation tendencies in grade one, are significantly different in grade two, and are a great deal different in grade three. Thus, it appears that manipulation of objects is an area of experiencing which tends to become more limited among girls than among boys as they go through the second and third grades.

Reading Experiences

Since it takes a prepared mind to think creatively and since the reading and information gathering habits of the more productive creative scientists are different from those of their less productive peers, the reading experiences of children are of especial interest in any consideration of the conditions necessary for fostering creative potential. In this section, I shall present data from a modest but larger study conducted by Victoria J. Punsalan (1961) under my direction. Other studies have shown that girls generally excel boys in various reading skills, but nothing much has been reported concerning differences in the reading habits and attitudes of boys and girls -- matters which make a difference in how what is read is used in thinking.

The data which will be presented here were obtained through questionnaires administered to 86 boys and 85 girls in three different schools and all in the sixth grade.

Results

Contrary to popular beliefs, the proportion of boys and girls who like to read is about the same. Almost all of the subjects in this study stated that they like to read and were able to give reasons why they like to read. Boys and girls in this study did differ, however, in what they would sacrifice or not sacrifice in order to read. Boys would be more likely than girls to give up going to a party in order to have time to read (31 per cent of boys and 18 per cent of girls, significant at .01 level of confidence). Girls, however, would be more likely than boys to sacrifice play activities, skating, and the like for reading (34 per cent of girls and 19 per cent of boys, significant at the .01 level of confidence).

A majority of both boys and girls spend from four to seven hours a week in leisure reading, in addition to the reading they do for their school assignments. Boys, however, are less likely than girls to go to the library for the purpose of checking out books for home reading (89 per cent of girls and 70 per cent of boys, significant at the .01 level of confidence). Girls also obtain more enjoyment than boys from giving oral book reports before the class (46 per cent of the girls and 23 per cent of the boys, significant at the .01 level).

As will be seen from Table 10.9, there are some interesting sex

Table 10.9

Comparison of Kinds of Books Boys and Girls Report That They Like to Read

	Boys (N=86)		Girls (N=85)	
Kind of Book	No.	%	No.	%
Sports	62	72	22	26*
Detective, Mystery	57	66	68	80
Jokes, Humor	54	63	61	72
Fiction	45	52	64	75*
Science Fiction	41	48	34	40
Travel, Adventure	40	47	49	58

Table 10.9: cont

Kind of Book	Boys (N=86) No.	Boys (N=86) %	Girls (N=85) No.	Girls (N=85) %
Hobbies	40	47	19	22*
Science	39	45	19	22*
History	33	38	28	33
Animal Stories	20	34	49	58*
Biography	25	29	33	39
Fairy Tales	20	23	50	59*
Classical Novels	20	23	44	52*
"How to do it"	19	22	13	15
Career Stories	16	19	35	41*
Art	16	19	18	21
Drama	15	17	37	44*
Poetry	13	15	29	34*
Religion	9	11	17	20*
Music	7	8	13	15

*Indicates that difference in percentages of boys and girls is significant at about the .05 level of confidence or better

differences in the kinds of books which boys and girls like to read. Boys express a greater preference than girls for books dealing with sports, science, and hobbies. Girls, however, express greater preference than boys for fiction, animal stories, fairy tales, classical novels, career stories, drama, poetry, and religion. These differences suggest rather clearly that girls have a stronger preference than boys at the sixth grade level for imaginative materials.

In spite of the fact that there is no difference in the expressed liking of boys and girls in this study for reading, girls report having read a larger number of books per month than boys. The mean number of books read per month is 7.5 for girls and 4.9 for boys (significant at the .05 level of confidence). Boys, however, report ownership of more books than do girls (significant at the .05 level of significance). Twenty-seven per cent of the boys own 50 or more books compared with 14 per cent of the girls owning this number.

Girls more frequently than boys ask for suggestions about what to read (50 per cent and 36 per cent respectively). Next to browsing through library shelves, girls read what is recommended by friends their own age. They also obtain books from their peers through exchanges of books. About three-fourths of the boys reported that they make most of their choices of reading matter by browsing through the library. Though peers influence their choices more than teachers and librarians, boys seem to be rather independent in selecting their reading material.

A majority of both boys and girls report that they sometimes become so absorbed in what they are reading that they are unable to think of anything else. A greater proportion of girls than boys report that this happens to them (83 per cent of the girls and 55 per cent of the boys). Both boys and girls, in about the same proportions, enjoy guessing what is going to happen next when they are reading something exciting (86 per cent of the girls and 82 per cent of the boys). Boys are more likely than girls, however, to check on the accuracy of a statement which they do not believe (63 per cent of the boys and 45 per cent of the girls, significant at the .05 level of confidence). Girls, however, tend to be more likely than boys to find errors in spelling and grammar during their reading, but the difference is not statistically significant (72 per cent of the girls and 62 per cent of the boys).

A greater proportion of girls than boys reported that they become so interested in their reading that there are times when they do not do other things that they should (74 per cent of the girls and 51 per cent of the boys). Both boys and girls, in about the same proportions, enjoy telling others about what they read (82 per cent of the boys and 84 per cent of the girls).

In general, then, both boys and girls report that they like to read. Girls read more books than boys but boys own more books than girls. Boys are more willing than girls to forego a party in order to read but girls are more willing than boys to forego skating or other games for this purpose. Both boys and girls feel that they are fairly independent in choosing what they shall read but boys appear to be somewhat more independent than girls in this respect. Girls express greater pleasure than boys about giving oral book reports before the class. Boys, however, appear to be just as anxious as girls to tell others about what they read. Apparently they prefer to talk about their reading with special friends, family members, or others who have similar interests than before a class. Boys and girls differ fairly markedly in the kinds of books they enjoy reading and this is probably related to differences in expectations for boys and girls. While girls appear more likely to become completely absorbed in their reading, boys are apparently more likely to stop and check the accuracy of some statement which they do not believe to be true. Thus, we have further clues concerning the ways in which differential rewards to boys and girls affect their experiencing.

What Effects Do Differential Rewards Have on Thinking Abilities?

The Problem

From the data which have already been presented in this chapter, it would be reasonable to expect that the differential rewards to boys and girls and the differences in their experiences have consequences insofar as the development of the creative thinking abilities are concerned. Some mention has already been made of the studies which have shown that men excel women on problem-solving tasks, including those which require intuitive thinking and of the pioneering tests of Johnson O'Ronner which showed that women are superior to men on creativity tests which require certain kinds of verbal abilities. Little actual attention, however, has been given to differences in the thinking abilities of children.

One of the rare studies which gives consideration to the differential development of the thinking of boys and girls is one by Pitcher (1963) and Pitcher and Prelinger (1963). In this study, fathers and mothers when questioned agreed that women are more indirect, illogical, and circuitous in their thinking than men. Men's thinking was considered to be more analytical, definite, precise, abstract, and direct. Through the use of drawings, stories, and other data, Pitcher and Prelinger found many interesting differences in the thinking of children from a very early age. They found that girls very early focus their interest in persons and boys on things and processes. Girls are more aware of themselves as persons than are boys. Girls very early show a greater interest in details than do boys. Boys, on the other hand, show greater interest in aggressive activities, independence, and less interest in pleasing others. These investigators concluded that boys and girls are from an early age subjected to influences that develop different thinking characteristics. The parents interviewed by them, however, were apparently unaware that they were doing or saying anything directly to cause these differences.

As one might hypothesize from the findings thus far presented, the matter of sex differences in creative thinking abilities is a complex one. The superiority of one sex over the other, as one might suspect, depends upon the age or educational level of the subjects and the nature of the task and kind of thinking involved. A section of a chapter in a report of this type is no place to treat this topic in a satisfactory manner. The adequate treatment of the problem requires a lengthy report all its own. This chapter would not be complete, however, without some examination of sex differences on the tests of creative thinking ability which have been described and discussed in this report. Thus, we shall present a few representative sets of data.

Ask-and-Guess Test (Sensing Problems)

Yamamoto (1962) has presented a fairly extensive set of data picturing sex differences on the Ask-and-Guess Test. Table 10.10 presents data on the question asking (sensing problems) part of this

Table 10.10[1]

Mean Number of Questions Asked on the Ask-and-Guess Test by Grade and Sex

Grade level	Number of Subjects Total	Male	Female	Mean frequency of questions Total	Male	Female
1	57	31	26	6.26	5.97	6.69
2	57	40	17	8.09	8.30	7.59
3	41	25	16	9.24	9.76	8.44
4	73	46	27	5.36	6.43	3.52
5	55	38	17	7.63	7.05	8.94

Table 10.10[1]

Grade Level	Number of Subjects			Mean frequency of questions		
	Total	Male	Female	Total	Male	Female
6	71	28	43	8.77	8.11	9.21
7	58	34	24	6.66	6.53	6.83
8	72	36	36	9.26	9.17	9.36
9	76	38	38	10.30	8.92	11.68
10	78	38	40	12.77	12.26	13.25
11	72	42	30	12.01	11.31	13.00
12	70	38	32	12.50	11.39	13.81
Adult	70	57	13	10.52	10.16	12.31
Total	850	259	359			

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[1] Adapted from Yamamoto, K. "Development of Ability to Ask Questions Under Specific Testing Conditions." Journal of Genetic Psychology, 1962, 101. 83-90.

test for males and females separately for grades one through twelve, and for a group of adults (graduate students in Educational Psychology). The subjects include the entire enrollment of an elementary school in a small Minnesota town, a Minneapolis high school, and a graduate class in educational psychology.

From Table 10.10 it will be observed that, as a general tendency, the number of questions produced in the Ask-and-Guess Test increases with grade. It reaches a maximum at about the end of the high school period and appears to decrease slightly. It also shows decreases at the fourth and seventh grade levels. The difference in variances between the third and fourth grades, as reported by Yamamoto (1962, p. 86) is significant at the .01 level and the difference in means, tested by the Welch-Astin Test, is significant at the .02 level of confidence. The differences in the variances and the means at the seventh-grade level are both significant at the .02 level of confidence. Except for the second, third, and fourth grades, the female subjects ask more questions than the male subjects. The largest difference occurs at the fourth-grade level.

Fifth Grade Differences

An interesting set of sex differences based on the Minnesota Tests of Creative Thinking has been reported by Bertha Evans Stroud (1962). Her subjects were 100 fifth-grade pupils who had also been administered a curiosity test developed by Maw and Maw (1960, 1961). The means reported by Stroud are presented in Table 10.11. It will be observed that boys excel girls on the test of Curiosity, Arithmetic Problem Solving, and Verbal Originality. Girls excel boys on all of the scores on the Ask-and-Guess Test, all of the scores on the non-verbal tests of creative thinking, and the tests of evaluative thinking.

Table 10.11

Summary of the Significance of the Differences Between the Means of Fifth Grade Boys and Girls on Different Measures of Intellectual Ability

Ability	Means	
	Boys	Girls
Curiosity	60.55	58.16*
Arithmetic Problem Solving	45.11	42.39**
Ask-and-Guess Fluency	18.30	23.10**
Ask-and-Guess Adequacy	15.66	19.64**
Ask-and-Guess Flexibility	10.55	12.92**
Verbal Originality	9.77	8.27*
Non-Verbal Originality	45.77	50.82*
Non-Verbal Elaboration	34.75	39.87**
Non-Verbal Fluency	21.41	24.14*
Non-Verbal Flexibility	10.44	11.87*
Evaluative-Thinking Fluency	21.82	25.19*
Total Evaluative-Thinking Score	47.97	47.32*

Note: There are no sex differences on the measures of intelligence, word knowledge, reading, language, verbal fluency, verbal flexibility, evaluative flexibility, and evaluative originality.

* Indicates that the difference in means between boys and girls is significant at the .05 level of confidence.

** Indicates that the difference in means between boys and girls is significant at the .01 level or better.

Differences Among Gifted Sixth Graders and Junior High Students

It is of special interest to know how boys and girls who have been identified as intellectually gifted differ in their thinking abilities. Data will be presented for an upper elementary and a junior high school group carefully identified as high achievers and placed in special programs to enhance their giftedness. These students were selected from an entire school system and the minimum Intelligence Quotient is 135 as determined by the Stanford-Binet.

The junior high school group consists of 75 seventh and eighth grade students (35 boys and 40 girls). The means and tests of significance for this group are presented in Table 10.12. It will be noted that the

Table 10.12

Comparison of Means of Gifted Junior High School Boys and Girls on Various Measures of Creative Thinking

Measure	Means		t-ratio	Level of Significance
	Male(N=35)	Female(N=40)		
Non-Verbal Fluency	8.22	6.62	2.729	<.005
Non-Verbal Originality	22.17	15.49	3.564	<.005
Non-Verbal Penetration	34.00	28.37	2.160	<.025
Consequences: Fluency	9.19	8.16	1.518	<.10
Consequences: Flexibility	7.64	6.58	2.074	<.025

Table 10.12: cont.

Measure	Means: Male(N=35)	Means: Female(N=40)	t-ratio	Level of Significance
Make-Up Arithmetic Problems	4.25	5.26	1.580	<.10
Make-Up Social Studies Probs.	4.22	7.51	3.640	<.005
Product Improvement: Fluency	10.64	10.67	-----	NS
Product Improvement: Flexib.	5.47	6.05	-----	NS
Product Improvement: Orig.	26.31	27.79	-----	NS
Ask Questions	12.36	12.79	-----	NS
Causal Hypotheses	8.33	7.68	-----	NS
Consequential Hypotheses	9.36	10.05	-----	NS
Unusual Uses: Fluency	7.97	8.86	-----	NS
Unusual Uses: Originality	21.64	23.93	-----	NS

boys excelled the girls on all of the scores derived from the non-verbal or visual tests and on both scores of the Consequences Test. The girls, however, show superiority on both of the made-up problems tests. They have a slight but non-significant edge on the boys on the Product Improvement, Ask-and-Guess, and Unusual Uses Tests.

The elementary school group consisted of 50 high achieving sixth-grade pupils (24 boys and 26 girls). The results of the Parallel Lines Test and the Ask-and-Guess Test are shown in Table 10.13. In this table

Table 10.13

Comparison of Means of Gifted Elementary Boys and Girls on Various Measures of Creative Thinking

Measure	Male (N=24)	Female (N=26)	t-ratio	Level of Signif.
Non-Verbal Fluency	12.19	10.61	1.23	NS
Non-Verbal Flexibility	9.38	7.83	1.12	NS
Non-Verbal Originality	7.96	5.65	2.12	<.025
Non-Verbal Elaboration	25.96	37.09	2.71	<.01
Asking Questions	9.43	12.17	2.32	<.025
Causal Hypotheses	7.43	9.39	2.09	<.025
Consequential Hypotheses	11.57	13.39	1.39	NS

it will be observed that on the non-verbal task, the boys excel the girls on originality but the girls turn the tables on the boys on the elaboration score of this same task. The girls outdistance the boys on two of the three subtasks of the Ask-and-Guess Test.

Summary

In this chapter, the author has presented a variety of evidence which he believes to be relevant to the problems created by differential rewards to boys and girls for specific kinds of creative behavior. He interprets the evidence as indicating that these differential rewards make off limits for both boys and girls whole areas of experiencing, perhaps needlessly, and that this takes a heavy toll upon the potentialities of both boys and girls. When teachers are asked deliberately to reward creative behavior, they describe incidents in which boys have been rewarded. This may mean that this shift in emphasis brings about a better equalization of rewards for boys. It may also mean that teachers reward the creative behavior of boys more frequently than they reward the creative behavior of girls. It may also mean that boys behave more creatively in the classroom, but even this may mean that girls are rewarded for conforming behavior and are satisfied with this reward.

In an experimental situation, it was found that children value more the ideas of boys about science matters than those of girls. Over a period of one year (1958-59 to 1959-1960) some kind of social-cultural change took place for the subjects of this study which apparently made it acceptable for girls to participate in science activities and to enjoy them. This change was not accompanied by a change in the value placed on the ideas of girls concerning the science toys used in this study. A study of the creative activities done on their own reported by children show that there are many areas of childhood creative experiencing which seem to be off limits for boys and girls apparently because of their sex. Similar phenomena are found in regard to the occupational goals or choices reported by children and young people. These differential rewards were also shown to be accompanied by differences in such experiencing as manipulation of objects and reading, kinds of experiencing which are likely to be related to creative achievement. Finally, it was shown that the influence of these differential rewards on the development of the creative thinking abilities is complex but that there are nevertheless differences which can be associated logically with the nature of the differential rewards and their influence on the kinds of experiencing open to boys and to girls.

Chapter 11

HOW DIFFERENTIAL REWARDS INFLUENCE ORIGINALITY[1]

Since educational research had repeatedly and consistently shown that people tend to learn and develop along whatever lines they find rewarding, I was willing to assume at the outset of this project that in order to encourage originality and other types of creative thinking, it is necessary to find ways of rewarding these kinds of achievement. With my own eyes, I had seen children do excitingly original thinking when the conditions had rewarded such achievement. I had also seen an almost total lack of originality of thinking when the conditions did not reward or punished this kind of achievement. Yet as I began to discuss the results of the experiments which will be described in Part III, I was continually challenged on my basic assumption. I was told repeatedly that I had no basis on which to make such an assumption. It might be true, my critics said, that educational research has repeatedly shown that people tend to remember those things which they know that they will be graded on or to learn motor skills which they find rewarding, but this does not mean that rewarding creative thinking will improve the quality of creative thinking. It is for this reason that we conducted the simple studies described in this chapter.

It is the purpose of the two modest experimental studies described herein to determine whether or not simple instructions in setting up the reward system for a creative activity can affect the differential nature of the thinking which results. Although I must admit that I entered into these studies with a strong bias due to previous studies and my own experiences in working with children in creative activities, every effort was exerted to follow as rigorous procedures as possible.

Before describing these two small studies, however, I would like to ask the reader to follow me imaginatively through one of my observational experiences. It was through such observational experiences that I formulated the designs of the studies described herein.

First, come with me to a first grade class. These children range in intelligence quotients from about 80 to 180, as determined by one of our better individually administered tests of intelligence, the Stanford-Binet. They come from a variety of backgrounds. Some are the children of doctors, lawyers, college professors, and engineers. Others are the children of milkmen, plumbers, mechanics, and factory workers. In some cases, the father is unemployed and on relief. Some of these children are clean and well-dressed; others are dirty and unkempt. They are indeed different. Let us see, however, how they behave when I administer the test. First, I shall administer the Picture Construction Test. Let's give each of them a blank sheet of paper and a colored triangle which is gummed on one side and can be placed anywhere on the page by licking the gummed side and sticking it in the desired position, just like a postage stamp. Let us ask them to think of a picture which they can make, using the colored triangle as one of the main parts and see what happens. Can you guess what kinds of pictures they will draw? Will their pictures be as different as they are? Let us look.

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[1] The author was assisted in the conduct of these studies by R. E. Myers.

Here is quick little Mary. She is using the triangle as the roof of a house. Let us see what Mark is doing. Yes, he is drawing a house too, and so is Tom who is sitting behind him. Surely the children in the back row must be drawing something else. Let us see what cute little Ann is drawing. Yes, she's drawing a house also. As we go around the classroom, we find that 24 of the 25 children have drawn houses. Only unruly, energetic, non-conforming Madeline over in the "isolation corner" has dared draw anything different. She used her triangle as a diaper on a baby. You will say, "Well, there is not much creativity here. All except Madeline produced commonplace objects all along the same pattern, just as similar as the houses in the housing development in which many of them live."

Let us go now into another first grade class in the same school. Classes in this school are not grouped according to ability. Children enrolled in the first grade are divided randomly among three teachers. Thus, we find the same range in intelligence quotient, socio-economic status, and the like that we found in the first class. Again, we shall administer the Picture Construction Test, only this time we'll make the instructions slightly different. We shall do more this time to try to free them to express their own ideas, to be creative. After distributing the materials, let us give them these instructions:

> "You have been given a blank sheet of paper and a triangular-shaped piece of paper. Think of a picture or an object in which this triangle will be an important part. Then lick the triangle on the gummed side just like you would a postage stamp and stick it wherever you want it on the page. Then add lines with your pencil or crayon to make your picture.
>
> "Try to think of a picture that no one else will think of. If you draw the picture that *you* think of, it probably *will be* different from anyone else's. Keep adding new ideas to *your* first idea to make it tell an interesting and exciting story."

Let us watch and see what happens now! Here is Sally. She is using her triangle as the top of an umbrella being carried by a girl leading a pig down the street. Bill is using his triangle as a Christmas tree and is decorating it with all of the presents he wants for Christmas. Helen is using hers as the skirt on a girl jumping the rope. Tom is making a kite out of his and decorating the kite which is sailing across a meadow. Peggy's triangle is a hat on a girl playing in the sunshine. Mike is using his as an arrow point whizzing through the air at a deer. Tom's is a high mountain in a busy camp scene. Jim's triangle becomes a part of a rocket and Sue's is a sail on a boat skimming on Lake Nokomis. No two are alike. They are as different as the boys and girls who drew them. They have been creative. They have gotten away from the obvious, the safe, the reproductive and dared to express their own, individual thoughts.

We have thus seen one example of how slight changes in the way we reward original thinking can free the creative thinking abilities and give us the rich diversity which goes with the achievement of potentialities. We noticed that in the first class there was little excitement. No one was interested in looking at what anyone else had drawn. In the second class, the reaction to one another's work was entirely different. Everyone was bubbling over with excitement to see what stories each other had told through their drawings. Whenever there is creative thinking in a classroom, we have almost always seen this excitement in learning. Everybody is anxious to show one another what they have done or tell them their story.

The methodological principle is a very simple one. In the first class, nothing was done to make it legitimate for each child to produce what he thought of. Each child had the usual expectation that there was one "right" response, the one that the teacher wanted. The teacher had made a triangular roof for the house she had them draw yesterday. Obviously, the "right" response (the response which would be rewarded) must be the picture of a house. In the second class, definite steps were taken to free each child to produce whatever picture occurred to him. It was legitimate for him to produce something rather than reproduce something. The instructions for the activity had assured the children that originality would be rewarded and they felt free to express their own ideas.

The Imaginative Story Writing Study

Authorities in the language arts field hold a diversity of points of view regarding what should be rewarded in children's writings. Most of the teachers with whom I have talked personally believe that the teacher should correct everything that the child writes beginning with kindergarten. Many teachers become acutely uncomfortable when their pupils are asked to participate in experiments which urge them to put their mental energies into the production of an interesting, exciting, original story without worrying about errors. The emphasis upon correctness has been so thoroughly taught that some children will burst into tears if they are not given an opportunity to copy meticulously their stories so that there will be no errors in them. Some authorities in the field, like Mauree Applegate (1949), urge that some things be written only to be read and enjoyed and that other things be written to be corrected. Some, like Ferebee (1950), maintain that correct form can be learned through creative expression in a setting in which children write stories freely and happily with an opportunity to share their stories with their fellows. Others recommend that two different grades be assigned to the creative writings of children -- one for correctness and another for creative qualities or content.

It is the purpose of the simple study described herein to investigate the differential effects of differential rewards on the creative writing of sixth-grade children.

Procedure

Four sixth-grade classes in one school were placed randomly into two experimental conditions. Pupils assigned to Condition A, were given the following instructions by their teachers:

> During this period we are going to participate in an impromptu story-writing contest. You will have your choice of the ten titles on the booklets which have been passed out.
>
> You will have 20 minutes in which to write your story. A prize of $2 will be awarded to the pupil in your grade who writes the best story. Stories will be judged on correctness of spelling, punctuation, grammar, and sentence structure; neatness and correctness of margins and indentation; and handwriting. You will want to make your stories interesting and original too, but the important thing is to avoid making errors.
>
> All right! Go ahead and write your stories on the booklets which you have been given. Write on both sides of the paper if you need to do so.

Pupils assigned to Condition B were given the following instructions by their teachers:

> During this period we are going to participate in an impromptu story-writing contest. You will have your choice of the ten titles listed on the booklet which has been passed out.
>
> You will have 20 minutes in which to write your story. A prize of $2 will be awarded to the pupil in your grade who writes the best story. Stories will be judged on the basis of how interesting, exciting, unusual, and original they are. You will want to write legibly and correctly, but the thing that really counts is interest *and originality*.
>
> All right! Go ahead and write your stories on the booklets which you have been given. Write on both sides of the paper if you need to do so.

Both groups were given the following list of suggested titles:

1. The dog that doesn't bark.
2. The man who cries.
3. The woman who can but won't talk.
4. The cat that doesn't scratch.
5. Miss Jones stopped teaching.
6. The doctor who became a carpenter.
7. The rooster that doesn't crow.
8. The horse that won't run.
9. The duck that doesn't quack.
10. The lion that doesn't roar.

Stories were obtained from 50 pupils under Condition A and 53 pupils under Condition B. Each story was scored for Originality and Interest according to the guide prepared previously by Torrance and described briefly in Chapter 4. Scorers did not know to which condition the writers had been assigned. To obtain objectivity in scoring for correctness Myers developed the following guide for determining the number of errors and a proficiency index of correctness for use with the imaginative writings of sixth grade pupils:

In order to obtain some measures of an elementary pupil's command of the skills of punctuation, grammar, spelling, sentence structure, and penmanship necessary to effective written communication, the following list of major errors may be used. In scoring a paper for technical proficiency, the judge should keep in mind that only the more serious types of mistakes in form are to be recorded. The skills which are denoted by the check list below are those which might reasonably be possessed by a sixth-grade pupil. Score one error when any of the following is detected:

Punctuation

1. Omission of period at the end of a sentence, after an abbreviation, after initials, to indicate dollars and cents.
2. Omission of comma after the various parts of an address, after the parts of a date, to set off a noun in direct address, to separate city and state, to separate the day of the month from the year, to separate a direct quotation from the words quoted, and to separate the two parts of a compound sentence when they are joined by a conjunction if the sentence is so constructed that the pupil would see a need for a pause. (In most cases, no penalty should be given for unnecessary commas.)
3. Omission of a question mark at the end of an interrogatory sentence.
4. Omission of an exclamation mark after sentences which contain strong elements of emotion.
5. Omission of an apostrophe where one is needed to show possession or contraction.
6. Omission of a hyphen when a word is divided at the end of a line.
7. Omission of a colon when writing time (or the substitution of a semi-colon for a colon in such a case).
8. Omission of quotation marks to indicate the speaker's exact words.

Spelling and Capitalization

1. Misspelling of a word.
   If the pupil spells a word incorrectly more than once, do not score for errors after the first misspelling.
2. Lack of capitalization.

Grammar

1. Incorrect use of a verb: where a verb does not agree with its noun subject in number; where an incorrect form is used ("He give me a dime," "Our teacher learns us arithmetic," etc.); where an incorrect form is used with a helping verb ("Jerry has went home," "I have writ so much my hand is tired," etc.); where an unacceptable form is employed ("That ain't my brother," "His little sister almost drownded in the lake last summer," etc.).
2. Incorrect use of a pronoun: where an objective pronoun is used in place of a nominative pronoun ("Him and me are good friends"); where a nominative pronoun is used in place of an objective pronoun ("The dog chased Jim and I," "The Jensens always invite we Smiths to their summer cottage," etc.); where a pronoun does not have an antecedent or where it is especially confusing as to which noun is the antecedent.

3. Incorrect use of an adjective: where the article "a" is used before a word beginning with a vowel or a vowel sound ("Mother gave me a egg and some cereal for breakfast," "Receiving the award was a honor he wouldn't forget," etc.); where "them" is used in place of "those" ("Give me them books!"); where the comparative or superlative forms are incorrect ("Jane is more better than Jill in spelling," "Harry is the bestest of all," etc.); where an adjective is used in place of an adverb ("Terry plays tennis good," "Ann really sings poor," etc.); where a pronoun is used unnecessarily with a noun ("My father he is a great fisherman," "Mr. and Mrs. Jones they have a farm," etc.).
4. Incorrect use of an adverb: where two negative words are used in a sentence but only one is necessary ("This coat isn't nothing like mine," "You don't hardly look the same in your new suit," etc.).
5. Incorrect use of a preposition: where "of" is used with "off" ("He got off of that horse in a hurry!"); where it is not necessary to use a preposition ("Where does she stay at when she is in Chicago?", "Where were you going to?").

Sentence Sense

1. Incomplete sentences or fragments ("However he wanted to travel," "Because of the girl's unhappiness," etc.).
2. Run-together sentences ("Harry ran from the house, when he got to the road he stopped abruptly." "Gary and his friends were always in trouble one day they got into trouble because they were throwing tomatoes which were not too fresh at the girls," etc.) Although fragments and run-together sentences involve errors of punctuation and captialization as well as of sentence structure, the judge should score a maximum of two errors when the pupil is guilty of this type of mistake.

Penmanship and Neatness

1. Crossed-out words and phrases.
2. Ugly erasures or smudges.
3. Illegible words.

Manuscript Form

1. Insufficient left-hand margin.
2. Insufficient right-hand margin.
   A maximum of two errors should be given for improper margins, even though the pupil uses two or more sides of a piece of paper.
3. Lack of indentation at the beginning of a paragraph.
   Because the use of direct quotations poses so many serious problems of form for an elementary pupil, the scorer should not expect the pupil to start a new paragraph for each change of speaker.

Miscellaneous

1. Omission of words where such omission causes confusion.

It is apparent whenever compositions are evaluated for accuracy of form that the pupil whose composition is lengthy runs the risk of having more errors than the pupil whose work is brief. Accordingly, a fair measure of technical proficiency should make some allowance for the length of the composition. This index attempts to take this factor into account by computing the total number of words written as well as the errors which have been noted by the scorer. Thus, the index is arrived at by showing the pupil's errors in relation to the length of his composition. For example, a pupil whose paper contained thirty-two errors and one hundred-forty-seven words would earn a rating of .782 (32/147 = .218 deficiency or .782 proficiency).

Results

The results of the foregoing analyses are presented in Table 11.1.

Table 11.1

Comparison of Performance of Subjects Under Conditions A and B on Originality, Interest, Number of Errors, Proficiency Index, and Total Number of Words

	Cond. A (N=50)		Cond. B (N=53)			Level of
Measure	Means	St. Dev.	Means	St. Dev.	t-ratio	Confidence
Originality	4.60	1.47	5.83	1.30	4.49	< .01
Interest	4.58	1.58	5.57	1.42	3.33	< .01
Number of Errors	9.92	6.23	25.83	16.41	6.63	< .01
Proficiency Index	.93	0.01	.84	0.03	7.59	< .01
Number of Words	161.16	4.95	165.19	5.49	0.39	NS

It will be noted that the primary reward for originality apparently resulted in a higher level of originality and interest and that the primary reward for correctness resulted in fewer errors and a higher proficiency index of correctness. There was a non-significant tendency for those working under the correctness reward.

Thus, the results of this simple, modest study support the contention that children tend to achieve along whatever lines they are rewarded, even when originality of thinking is concerned.

Originality of Ideas of Gifted Children

The author has on a number of occasions been presented with the argument that it is not necessary to reward gifted children for creative thinking. Gifted or high achieving children, they maintain, are not influenced by such rewards and produce original ideas without being encouraged to do so. The present, small experiment with two classes of carefully selected, high achieving sixth-grade pupils was designed to explore some of the problems posed by those who present arguments of this nature and to explore further the original hypothesis that creative thinking is influenced by differential rewards.

Procedures

The two classes of high achieving pupils were each divided randomly into Groups A and B. This was done by having each pupil draw an assignment card from a stack which had been carefully and obviously shuffled. The two experimenters, the authors, tossed a coin to see who would have which group and who would have which treatment. (These arrangements were made rather obvious to communicate the concepts of randomization, treatments, and the like. Afterwards, the reasons for them were explained.) All members of Group A assembled in one of the classrooms and all of the B's in the other. Twenty-three subjects were placed in Condition A and 22 in Condition B.

Group A was given the following instructions:

> "Your task is to think of ideas for improving this stuffed toy dog so that it will be more fun for a child to play with. Try to think of just as many ideas as you can. Don't worry about how good your ideas are or how much it would cost to carry them out. A prize of two dollars will be awarded to the one who thinks of the largest number of ideas, regardless of how clever or original they are. Of course you want to think of clever and original ideas, so we shall give a prize of twenty-five cents to the one who thinks of the largest number of unusual or original ideas. You will have only ten minutes, so you will want to make good use of your time."

Group B was shown identically the same stuffed toy dog and given the following instructions:

> "Your task is to think of ideas for improving this stuffed toy dog so that it will be more fun for a child to play with. Try to think of as clever, unusual, and original ideas as you can. Don't worry about how much it would cost to carry them out. A prize of two dollars will be awarded to the one who thinks of the largest number of clever, unusual, or original ideas. A prize of twenty-five cents will be awarded to the one who thinks of the largest number of ideas, no matter whether they are original or not. You will have only ten minutes, so you will want to make good use of your time."

Responses were scored for Fluency, Flexibility, and Originality. Fluency was determined by counting the number of relevant ideas given. Ideas not related to the improvement of the toy as something to play with were eliminated as not relevant. Flexibility was determined by counting the number of different approaches used in making the improvements. The categories used are as follows:

1. Adaptation
2. Addition
3. Change color
4. Change shape
5. Combination
6. Division
7. Magnification
8. Minification
9. Motion
10. Multiplication
11. Position
12. Quality of material

13. Rearrangement
14. Reversal
15. Sensory appeal (ear)
16. Sensory appeal (eye)
17. Sensory appeal (nose)
18. Sensory appeal (touch)
19. Substitution
20. Subtraction

These categories are described and illustrated more fully in Guiding Creative Talent (Torrance, 1962a). A response was scored as original if it had been given by fewer than five per cent of the subjects in a norm population of 594 subjects and if they showed creative strength.

Results

The means, standard deviations, and t-ratios on fluency, flexibility, and originality for the subjects in Conditions A and B are presented in Table 11.2. It will be noted that the differential instructions with the accompanying differential rewards apparently influenced significantly the originality of the thinking of gifted sixth grade pupils with relatively little difference in fluency and no difference in flexibility. In fact, the subjects rewarded for originality of thinking produced about twice as many original responses as did their peers who were being rewarded for sheer number of responses. (It should be pointed out that irrelevant, "wild" responses were eliminated and are not counted in the above results. It should also be pointed out that the subjects rewarded for original responses did produce a larger number of such responses than their peers.)

Table 11.2

Comparison of Performance of Subjects Under Conditions A and B on Fluency, Flexibility, and Originality Scores of Product Improvement Test

Measure	Cond. A (N=23)		Cond. B (N=22)		t-ratio	Level of Confidence
	Means	S. Dev.	Means	S. Dev.		
Fluency	23.0	7.95	20.4	6.73	1.19	< .25
Flexibility	8.5	2.43	8.5	1.84	----	NS
Originality	6.2	3.60	12.2	6.12	4.00	<.01

Conclusions

The evidence obtained from the two modest studies described in this chapter support strongly the conclusion that differential rewards influence originality of thinking. Giving instructions in terms of rewards for correctness or for quantity with secondary attention to originality appear to work against the production of original ideas.

Chapter 12[1]

EFFECTS OF THREE TYPES OF EVALUATIVE PRACTICE IN CREATIVE BEHAVIOR

There is little scientifically-developed information about the evaluative conditions underlying an educational environment which is favorable or unfavorable for creative behavior. It is generally believed, however, that one of the most important factors in the educational environment is the evaluative practices of the teacher. This is especially true of the concept of the role of the teacher in the United States. Investigators and theorists in the field of creative behavior, however, advocate a range of practices relative to evaluation, all of which would suggest that the evaluative role of the teacher in the classroom may be inimical to the development of creative behavior.

Osborn (1957, 1963), Clark (1958), Parnes and Meadow (1959, 1960), and others consider negative evaluation or criticism a serious enemy of creative thinking. Stein (1958) maintains that the creative environment is neither hostile, critical, nor evaluative. Rogers (1954) asserts that external evaluation is always a threat, elicits defensiveness, and results in denying to awareness some portion of experience. He suggests that external evaluation should be absent if the environment is to be favorable for creative work.

H. H. Anderson (1960), on the other hand, maintains that there would be no incompatibility between external evaluation and creativity, "if the external evaluation were communicated without threat or without effort to close the life space of another." He explains that creativity arises through the confronting and the free interplay of differences. This requires an open environment in which there is integrity of differences, substance, honesty, and truthfulness in differences along with openness which is devoid of threat and intentionality of control.

Most of the educational research concerning the role of external or teacher evaluation and learning has involved comparisons of the relative effects of praise and punishment, praise and criticism, approval and correction, and the like. Although some of the studies involving the praise-criticism dimension have resulted in no statistically significant differences, most of the differences appear to be in favor of praise. Some of the more recent studies have shown that even the praise-criticism dimension is rather complex in its interaction with other variables. An example of such a study is one by Zigler and Kanzer (1962) investigating the interaction of praise-correction with social class. Zigler and Kanzer concluded from their experiments that praise is more effective than correction with lower-class children while correction is more effective than praise with middle-class children. Apparently praise is more rewarding to lower-class children and correction is more rewarding to middle-class children. None of these studies, however, have dealt with criteria involving creative thinking.

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[1] This chapter was prepared by Dr. Gordon R. Eastwood, now a member of the faculty of the University of New England, Armidale, New South Wales, Australia.

In the early studies of the University of Minnesota Bureau of Educational Research with young children, it was found that creativity scores increased considerably, in many cases, when children were asked to think of ideas "just for fun" and when it did not count towards winning a prize or other reward. It will be recalled from Chapters 5 and 6 that teachers in in-service programs were encouraged to provide practice periods during which pupils can explore a variety of possibilities without fear of evaluation. This implies that it is not enough to refrain from evaluation for a certain period of time but that it is also necessary to encourage individuals to free themselves from habitual restraints and experiment and explore without fear of devastating failures which will mar future chances of success.

The study reported herein was undertaken to investigate the influence of three different evaluative conditions during a practice period on the ability of elementary school children in the intermediate and upper grades to produce ideas about and discover principles underlying toys that had been designed to illustrate simple scientific principles. Subsequent chapters will present studies designed to study the effectiveness of unevaluated practice and different types of peer evaluation during practice.

Procedures

Subjects

The experimental population consisted of the grades 4, 5 and 6 classes in an elementary school which draws its enrollment from a middle-class population largely of trade and commercial people. A total of 174 pupils was involved (grade 4 = 46; grade 5 = 62; and grade 6 = 66).

Orientation

The Principal Investigator introduced the project to the subjects in their classrooms by explaining that the idea of the investigation was to find out how boys and girls, working in small groups, can be helped to think up ideas about "science things." They were also told that the job of each group was to think up as many ideas as possible about the ways in which the toys could be used, to figure out the principles they illustrated, and to make up uses other than those for which the particular toy was designed. They were further told that "we are interested only in what your group can do, not what you as an individual can do."

Each class was divided into groups of approximately five each by distributing randomly suitably numbered cards. The practice period conditions were then allocated to experimenters on a rotational basis and the groups randomly assigned to the experimenters.

Experimental Program

The experimental program was divided into two phases, the practice session and the test session.

1. Practice Session

During this session (25 minutes) each group was given Science Toy Collection No. 3 (Library of Science) and made free to practice and experiment with the toys. During the session a trained experimenter recorded the responses and reactions of the group and applied the experimental manipulation condition allotted to the group. The form used in recording observations is included in the Appendix. To obviate the possibility of individual experimenter's bias in favor of one manipulative condition all experimenters used all three conditions in turn.

2. Test Session

This session was conducted immediately after the practice session. Each group was given Science Toy Collection No. 2 and instructed to proceed as for the practice session. The experimenter recorded as fully and accurately as possible all responses of the group and marked a check list of behavior.

Experimental Treatments

The three experimental manipulation conditions were described to the experimenters in the following terms:

1. Condition "A": Identification of Defects

Identify and point out defects in the demonstrations and explanations given. Refrain from giving praise, offering other suggestions and the like. Only correct errors, inaccuracies, inadequacies, etc. Make corrections as accurate and complete as possible, but make them diplomatically.

2. Condition "B": Suggestion of Other Possibilities

Refrain from identifying defects in explanations and demonstrations. Instead show other uses, other things the toys can do, other explanations, other science principles that can be illustrated. Negative criticism must be taboo.

3. Condition "C": Combination

Combine identification of defects with suggestion of other possibilities. In pointing out defects explain why something else is more satisfactory. Show other uses, other things the toys can do, other explanations, other science principles, etc.

During the test session the experimenter was required to remain neutral and simply record all ideas and explanations given and to check types of behavior noted in the group.

At the conclusion of the test session each member of the group was given a short questionnaire which required the following questions to be rated on a five-point scale:

a. Are you interested in science things?
b. Did the practice session help you?
c. Do you think your group did the best it could?
d. How much did you enjoy the activity?

Scoring

The three phases of the experiment were scored according to several dimensions as set out below. A dichotomous (0,1) scoring scale was used.

Practice Session

a. Number of toys demonstrated. (td)
b. Number of uses demonstrated. (ud)
c. Number of science principles explained. (pe)
d. Number of times experimental manipulation was applied. (em)
e.* Signs of Social Stress -- two categories: positive (ss+) and negative (ss-) behavioral responses. Obtained from check-list.

*Each category scored twice: (a) Number of types of behavior (b) Total number of occurrences.

Test Session

1. The recorded remarks, suggestions and ideas of each group were analyzed and scored for each toy according to the following dimensions:

a. Identification of intended uses (I)
b. Unintended uses -- ideas (U)
c. Explanation of principles (E)
d. Unusual explanations (UE)

2. Check list of positive and negative social stresses -- as used in practice session. The complete list of behaviors recorded will be found in the Appendix.

Subject Questionnaire

Each of the four questions was scored along a five-point scale with "1" designating the most extremely negative end of the scale.

Results

The total scores for the practice session are tabulated for school grade and experimental condition and set out in Table 12.1.

Table 12.1

Total Scores for Practice Session by Grade and Experimental Condition

Grade	Condition	Number Groups	1 td	2 ud	3 pe	4 em	5 ss-	6 ss+	7 Tss-	8 Tss+
4	A	3	32	48	11	13	4	17	6	34
	B	4	43	64	14	29	22	22	48	37
	C	4	26	21	12	26	14	21	14	30
5	A	4	30	43	15	24	10	22	17	36
	B	4	26	46	13	18	14	28	35	80
	C	4	36	47	17	25	8	25	11	57
6	A	4	35	25	20	22	22	32	47	134
	B	4	32	49	19	30	10	29	22	63
	C	4	29	32	14	34	14	29	24	59

The analysis was carried out by combining the scores for all grades and considering only "between-experimental-conditions" differences. Table 12.2 shows these scores expressed as totals and means for each of the eight dimensions of the practice session.

Table 12.2

Mean and Total Scores for the Three Experimental Conditions for Each of the Eight Dimensions of the Practice Session

Condition		Number Groups	1 td	2 ud	3 pe	4 em	5 ss-	6 ss+	7 Tss-	8 Tss+
A	(T)	11	97	116	46	59	36	71	70	204
	(M)		8.82	10.55	4.18	5.36	3.27	6.45	6.36	18.55
B	(T)	12	101	159	46	77	46	79	105	180
	(M)		8.42	13.25	3.83	6.42	3.83	6.58	8.75	15.00
C	(T)	12	91	100	43	85	36	75	49	146
	(M)		7.58	8.33	3.58	7.08	3.00	6.25	4.08	12.17

Examination of Table 12.2 tends to suggest that the means in columns 7 and 8 are sufficiently different to be significant. However, the analysis of variance summary in Table 12.3 shows that the differences are not significant at the 5 per cent level. The difference of means is the result of a few widely discrepant values.

The analysis of variance summary for the practice session is presented in Table 12.3.

Table 12.3

Analysis of Variance Data to Test Significance of Differences between the Three Experimental Conditions on the Eight Dimensions of the Practice Session

Dimension	Source Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Number Toys Demonstrated	Bet. Cond.	2	4.608	.4195	n.s.
	Within	32	10.983		
2. No. of Uses Demonstrated	Bet. Cond.	2	51.778	.6995	n.s.
	Within	32	74.020		
3. No. of Principles Explained	Bet. Cond.	2	1.033	.1850	n.s.
	Within	32	5.569		
4. No. of Times Explained Manip. Applied	Bet. Cond.	2	7.663	1.1645	n.s.
	Within	32	6.580		
5. No. of Types Social Stress (Negative)	Bet. Cond.	2	3.1948	.3213	n.s.
	Within	32	9.9431		
6. No. of Types Social Stress (Positive)	Bet. Cond.	2	.3388	.0459	n.s.
	Within	32	7.3716		
7. Total Occur. Social Stress (Negative)	Bet. Cond.	2	60.8200	.9316	n.s.
	Within	32	65.2826		
8. Total Occur. Social Stress (Positive)	Bet. Cond.	2	271.1079	.8766	n.s.
	Within	32	309.2589		

This analysis indicates that the three types of experimental manipulation as defined by the conditions A, B and C did not significantly influence the productivity or behavior patterns of the groups. A similar analysis of the test session data is presented in Tables 12.4, 12.5 and 12.6.

Table 12.4

Total Scores for Each of the Six Scoring Dimensions of the Test Session by Grade and Experimental Condition

Grade	Experimental Condition	Number Groups	1 (I)	2 (U)	3 (E)	4 (UE)	5 (SS-)	6 (SS+)
4	A	3	12	5	11	0	7	31
	B	4	19	9	10	2	31	53
	C	4	11	2	12	0	17	21
5	A	4	24	13	20	4	17	34
	B	4	25	8	16	2	15	62
	C	4	21	10	15	2	11	52
6	A	4	8	0	16	1	48	27
	B	4	9	5	30	1	22	24
	C	4	13	2	19	0	20	31

Table 12.5

Total Scores and Means for the Six Dimensions and the Three Experimental Conditions on the Test Session

Condition		Number Groups	1 (I)	2 (U)	3 (E)	4 (UE)	5 (SS-)	6 (SS+)
A	(T)	11	44	18	47	5	72	92
	(M)		4.00	1.64	4.27	.45	6.55	8.36
B	(T)	12	53	22	56	5	68	139
	(M)		4.80	2.00	5.10	.45	6.20	12.60
C	(T)	12	45	14	46	2	48	104
	(M)		3.75	1.20	3.80	.17	4.00	8.75

Table 12.6

Analysis of Variance Data to Test Significance of Differences between the Three Experimental Conditions on the Six Dimensions of the Test Session

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Intended Uses Explained	Bet. Cond.	2	1.3596	.1517	n.s.
	Within	32	8.9739		
2. Unusual Uses Explained	Bet. Cond.	2	1.4035	.2643	n.s.
	Within	32	5.3087		
3. Principles Explained	Bet. Cond.	2	2.0850	.3616	n.s.
	Within	32	5.7660		

Table 12.6: cont.

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
4. Unusual Explanations	Bet. Cond. Within	2 32	.2876 .5409	.5317	n.s.
5. Total Occur. Social Stress (Negative)	Bet. Cond. Within	2 32	19.3888 29.8560	.6494	n.s.
6. Total Occur. Social Stress (Positive)	Bet. Cond. Within	2 32	37.2213 82.5665	.4509	n.s.

The analysis indicates that the three types of experimental manipulation as defined by the conditions A, B and C did not significantly influence the productivity or behavioral patterns of the groups during the test session immediately following the practice session. An examination of Table 12.5 indicates that such differences as do occur tend to be in favor of Condition B and that there is perhaps some reason for suspecting that the important factor in the environment might be negative criticism. Some further evidence in favor of this view is contained in subsequent

Table 12.7

Total Scores and Means for the Four Dimensions and the Three Experimental Conditions on the Pupil Questionnaire

Condition		Science Interest	Value of Practice	Group Performance	Degree of Enjoyment
(A)	Total	229	226	220	249
(55)	Mean	4.16	4.11	4.00	4.53
(B)	Total	224	252	237	275
(59)	Mean	4.14	4.27	4.02	4.66
(C)	Total	234	243	248	259
(60)	Mean	3.90	4.05	4.13	4.32

Table 12.8

Analysis of Variance Data to Test Significance of Differences between the Three Experimental Conditions on the Four Dimensions of the Pupil Questionnaire

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Interest in Science	Bet. Cond. Within	2 171	1.2310 1.3585	.906	n.s.
2. Value of Practice Session	Bet. Cond. Within	2 171	0.7310 0.7334	.997	n.s.
3. Estimate of Performance of Group	Bet. Cond. Within	2 171	0.618 0.6464	.309	n.s.
4. Degree of Enjoyment	Bet. Cond. Within	2 171	1.7935 0.6754	2.655	n.s.

analyses. Although no significant differences are recorded in Table 12.8, an examination of the means presented in Table 12.7 shows that such differences as do exist tend to be in favor of Condition B. This is consistent with the findings in the earlier parts of the analysis and suggests again that this condition does tend to provide a better environment for creative thinking. However, the results are such that little reliance can be attached to the suggestion. It was, however, believed that further examination and analysis of the data should be undertaken to explore this possibility. It is noted that for significance at the 5 per cent level a value of 3.06 is necessary for F (2,171) and thus the value for the dimension "Degree of Enjoyment" approaches significance. Reference to Table 12.7 reveals that this is in favor of Condition B -- the condition under which no corrective criticism was applied. This agrees with previous findings regarding this condition.

The foregoing examination and analyses of the data led to the suggestion that "frequency of application of the experimental treatment" might have a significant influence upon the performance of the groups under the experimental conditions. To examine this possibility the data for each experimental condition were separated into two classes according to frequency of application as follows:

1. High- All groups which, during the practice session, received the appropriate experimental manipulation six or more times.
2. Low - All groups which, during the practice session, received the experimental manipulation five or less times.

The analysis of the data arranged according to these criteria for the test session is set out in Tables 12.9, 12.10, and 12.11.

Table 12.9

Analysis of Variance Data to Test Significance of Difference between High and Low Application of Experimental Treatment for Experimental Condition A on the Six Dimensions of the Test Session

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Intended Uses	Between	1	.3924	.0250	n.s.
Explained	Within	9	15.9600		
2. Unusual Uses	Between	1	.1169	.0190	n.s.
Explained	Within	9	6.05		
3. Principles	Between	1	.0030	.0009	n.s.
Explained	Within	9	3.13		
4. Unusual	Between	1	.0130	.0174	n.s.
Explanations	Within	9	.7460		
5. Total Occur. Social	Between	1	3.977	.0680	n.s.
Stress (negative)	Within	9	58.080		
6. Total Occur. Social	Between	1	93.830	2.3400	n.s.
Stress (Positive)	Within	9	40.080		

Table 12.10

Analysis of Variance Data to Test Significance of Difference between High and Low Application of Experimental Treatment for Experimental Condition B on the Six Dimensions of the Test Session

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Intended Uses Explained	Between	1	44.08	6.59	< .05
	Within	10	6.68		
2. Unusual Uses Explained	Between	1	11.999	2.517	≃ .15
	Within	10	4.760		
3. Principles Explained	Between	1	.333	.036	n.s.
	Within	10	9.230		
4. Unusual Explanations	Between	1	.0832	.1217	n.s.
	Within	10	6.8300		
5. Total Occur. Social Stress (Negative)	Between	1	56.333	3.023	≃ .10
	Within	10	18.630		
6. Total Occur. Social Stress (Positive)	Between	1	420.08	8.288	< .05
	Within	10	50.68		

* The significant difference obtained for dimension 1 of Condition B is interesting because the difference is in favor of those groups to which the experimental manipulation is least frequently applied.

Table 12.11

Analysis of Variance Data to Test Significance of Difference between High and Low Application of Experimental Treatment for Experimental Condition C on the Six Dimensions of the Test Session

Dimension	Source of Variance	Degree Freedom	Mean Square	F-ratio	Level of Significance
1. Intended Uses Explained	Between	1	.15	.047	n.s.
	Within	10	3.21		
2. Unusual Uses Explained	Between	1	1.067	.195	n.s.
	Within	10	5.460		
3. Principles Explained	Between	1	.2667	.042	n.s.
	Within	10	6.3400		
4. Unusual Explanations	Between	1	.0667	.185	n.s.
	Within	10	.3600		
5. Total Occur. Social Stress (Negative)	Between	1	.600	.032	n.s.
	Within	10	18.540		
6. Total Occur. Social Stress (Positive)	Between	1	135.0	1.142	n.s.
	Within	10	118.4		

In the case of the data from the practice session analysis under these criteria was confined to the Factors 1, 2 and 3 (toys demonstrated, uses demonstrated and principles explained). The analysis is set out in Tables 12.12, 12.13 and 12.14.

Table 12.12

Analysis of Variance Data to Test the Significance of the Differences between High and Low Application of the Experimental Treatment for Experimental Condition A on the Three Dimensions of the Practice Session

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Number Toys	Between	1	7.712	.595	n.s.
Demonstrated	Within	9	12.052		
2. Number Uses	Between	1	20.263	.275	n.s.
Demonstrated	Within	9	72.607		
3. Number Principles	Between	1	23.458	2.701	n.s.
Explained	Within	9	8.607		

Table 12.13

Analysis of Variance Data to Test the Significance of the Difference between High and Low Application of the Experimental Treatment for Experimental Condition A on the Three Dimensions of the Practice Session

Dimension	Source Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Number Toys	Between	1	60.740	5.514	< .05
Demonstrated	Within	10	11.017		
2. Number Uses	Between	1	396.75	4.214	< .05 < .10
Demonstrated	Within	10	94.15		
3. Number Principles	Between	1	5.333	.982	n.s.
Explained	Within	10	5.433		

* As in the case of the test session summarized in Table 12.9 a significant difference is obtained for Dimension 1 of Condition B and again the difference is in favor of the group to which the experimental treatment was least frequently applied. An F value of 4.96 is required for significance (5%) and so Dimension 2 approaches significance at the 5% level.

Table 12.14

Analysis of Variance Data to Test the Significance of the Difference between High and Low Application of the Experimental Treatment for Experimental Condition C on the Three Dimensions of the Practice Session

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Number Toys	Between	1	4.817	.801	n.s.
Demonstrated	Within	10	6.010		
2. Number Uses	Between	1	.2667	.0076	n.s.
Demonstrated	Within	10	34.7400		
3. Number Principles	Between	1	.8167	.506	n.s.
Explained	Within	10	1.6100		

The significant results for Dimension 1 of Condition B for both Practice and Test Sessions shown in Tables 12.9 through 12.14 raised the question as to whether any differences exists between the three types of experimental conditions or whether the differences are due only to the frequency of application of the experimental manipulation. To explore this possibility further the data for all conditions were combined and divided into two groups according to the frequency of application of the experimental treatment. The High and Low application criteria were the same as used for the analyses shown in the foregoing tables. Analyses were carried out for both practice and test sessions and summary tables are set out in Tables 12.15 and 12.16.

Table 12.15

Analysis of Variance Data to Test the Significance of Differences between High and Low Application of the Experimental Treatment for the Three Dimensions of the Practice Session when All Experimental Conditions are Combined

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Number Toys	Between	1	68.0023	7.677	$<.05$
Demonstrated	Within	33	8.8691		
2. Number Uses	Between	1	280.1166	4.217	$<.05$
Demonstrated	Within	33	66.4207		
3. Number Principles	Between	1	17.2023	3.481	n.s.
Explained	Within	33	4.9419		

Table 12.16

Analysis of Variance Data to Test the Significance of the Differences between High and Low Application of the Experimental Treatment for the Six Dimensions of the Test Session when All Experimental Conditions are Combined

Dimension	Source of Variance	Degrees Freedom	Mean Square	F-ratio	Level of Significance
1. Intended Uses	Between	1	23.3358	2.889	n.s.
Explained	Within	33	8.0772		
2. Unusual Uses	Between	1	5.4858	1.033	n.s.
Explained	Within	33	5.3090		
3. Principles	Between	1	.5358	.094	n.s.
Explained	Within	33	5.7015		
4. Unusual	Between	1	.0024	.006	n.s.
Explanations	Within	33	.4207		
5. Social Stress	Between	1	1.4881	.028	n.s.
(Negative)	Within	33	51.8085		
6. Social Stress	Between	1	144.0858	1.816	n.s.
(Positive)	Within	33	79.3393		

F (.05) = 4.15 (1, 32 df)

The absence of significant differences in this analysis reinforces the view that the experimental manipulation tends to act as an "interference mechanism" and thus to have more effect upon the data collected simultaneously with the application of the treatment.

Discussion

The results presented herein are far from conclusive. The study was designed to investigate the effects of three types of experimental conditions on the productivity and originality of small groups of elementary school pupils when presented with science toys and asked to identify uses, explain principles and suggest unusual uses. The analysis reveals no statistically significant difference between the performances of the groups under the three experimental conditions but there does appear to be some indication that the group which was subjected to no criticism of its efforts tended to give results showing higher productivity.

A reorganization of the data using "frequency of application" of the experimental treatment as the criteria for grouping within each experimental condition was undertaken. The analysis shows that, under the condition that involved no "criticism," productivity was significantly greater for the group to which the experimental treatment was least frequently applied. This result was obtained for both sets of data -- from practice and test sessions -- and in both cases the significance was found on Dimension 1 (Number of toys demonstrated/Number of uses explained). This tends to support the view that productivity is negatively correlated with amount of criticism.

A combination of all data so that the three experimental conditions were disregarded and the only difference between the groups was "frequency of application" of the experimental treatment produced a similar result in the case of the data of the practice session. In fact in this instance significant differences are found on two of the three scoring dimensions. Under this form of organization of the data "frequency of application" of the experimental condition may be considered as "frequency of interference," a terminology in keeping with significance in favor of low application of treatment. The absence of a significant difference on the third scoring dimension could, perhaps, be attributed to the fact that "explanation of principles" proved difficult for children of these ages and the number of responses was small.

In the case of the data from the test session the combined analysis did not produce significant results. This supports the view that when all conditions are combined the treatment may be interpreted as an "interference factor." Hence, data obtained (practice session) concurrently with "application of the treatment" is more influenced by the treatment than data obtained (test session) at a subsequent stage when experimental manipulation was not being applied.

The appearance of significant differences under Condition B for both practice and test session tends to suggest that when criticism is the only factor involved in the treatment the effect is strong enough to carry over to the test session.

Further investigation of this feature could have been undertaken if a student questionnaire had been completed immediately after the practice session as well as after the test session. Unfortunately this possibility was not foreseen and the data were not available.

Further support for the hypothesis that the evaluation procedures used in the experiment served as an "interference factor" is found when data from this experiment are compared with those obtained in two other experiments using identically the same testing situation as was used here. In the previous experiments involving the fourth, fifth, and sixth grades of three schools, the experimental variables were heterogeneity and homogeneity of grouping. The practice session involved no evaluation whatsoever; the subjects were encouraged to explore and experiment. The toys and the working time were the same. No claims can be made for the equivalence of student bodies. The data in the other studies were analyzed only in terms of total number of ideas demonstrated and principles explained. If we combine the four categories comprising this total in the present study we obtain a mean total score of 10.28. By comparison, a mean of 27.07 and a range of 15 to 45 was obtained in School A in an earlier experiment. In School B, the mean total was 26.0 and in School C, 37.33.

In conducting this experiment, we had not considered it necessary to have a control condition, since previous research in problem solving has quite consistently shown that evaluative feedback increases group productivity. In fact, it is difficult to specify what a control condition would be, since teachers almost always give some kind of evaluative feedback. We could have defined it as giving no evaluative feedback, but we had already conducted experiments involving this condition. Thus, we defined our problem simply as comparing the relative effectiveness of the three evaluative procedures used.

A review of the experimenters' observations in this study reveal that few of the groups functioned as groups. In fact, the experimenters who had participated in the earlier studies in Schools A, B and C noted a comparative lag in the development of skills of social organization among the groups in this study. For this reason, we probably cannot expect results from group problem-solving to hold. Nevertheless, it is difficult to discount the hypothesis of "evaluation as an interference factor" in creative problem-solving.

Summary

This experiment was set up to test the hypotheses that "creative productivity" of small groups of elementary school children is influenced by the type of evaluative practice applied during a practice session. Groups were randomly selected and the three forms of experimental manipulation applied randomly to them. The experimental conditions were, "criticism and correction," "suggestion of other possibilities" and a combination of these two. The practice and test tasks required the subjects to demonstrate and explain the scientific principles underlying the operations of sets of science toys.

The analyses revealed no statistically significant differences between the performances of the groups. Significant differences were found when data were divided according to "frequency of application" of the treatment. This difference was in favor of the group to which the experimental treatment was least frequently applied and as a result it is suggested that the treatment acts as an "interference mechanism" and when frequently applied tends to "inhibit" productivity of the group.

Chapter 13[1]

COMPETITION AS A TYPE OF EXTERNAL EVALUATION

Since our society is a competitive one and gives many of its rewards on the basis of competition, children are conditioned early to excel in activities which are rewarded through competition. Thus, the study of the role of evaluation in the development of creative thinking requires that attention be given to the study of the effects of competition upon creative behavior. The study described in this chapter does not by any means do justice to the issue and even runs the danger of being misunderstood. If interpreted in the light of the problem which it investigates, however, it does give evidence of both some of the advantages and limitations of competition in evoking creative behavior. It does not tell us anything about the cumulative effects of competition on creative behavior.

In an earlier study (Torrance, 1961c) involving grades one through three, it was found that children under competitive conditions achieved higher fluency and flexibility scores on the Product Improvement Task than under non-competitive conditions. In fact, the competitive conditions produced about twice as many responses at all three grade levels as the noncompetitive conditions. In this earlier study, the children in the noncompetitive conditions had not been given any specific "warm-up" or practice for this particular task. Thus, some have suggested that what was really lacking in the noncompetitive condition was a "warm-up experience" and that such an experience without competition would have produced just as good results. The study described herein is an exploratory one to test the hypothesis implied in this suggestion.

There is a persistent and recurrent note concerning competition in the literature about adult creativity. It pervades the literature concerning invention, scientific discovery, industrial product improvement, and even the arts. Present-day educators writing about conditions necessary for the development of creative thinking and the expression of creativity have been strangely silent on the issue of competition. Art educators have perhaps been more articulate than others on this issue. Viktor Lowenfeld (1952), for example, rather consistently argued against the use of competition except with oneself. He maintained that the family and the natural classroom condition will confront the child with enough competitive experiences and that the child is unable to see the achievement of others beyond his own level. Benson (1958) argues against evaluation of creative products and competition in creative activities on the basis of our lack of satisfactory criteria in making judgments and maintains that those who excel are least in need of encouragement.

Since competition implies external evaluation, however, one may assume that many current writers concerning creativity would oppose the use of competition. The elimination of external evaluation in promoting creativity holds a major place in the theories of Rogers (1954), Stein (1958), and Osborn (1957). Although the attack on competition in education has continued to arise here and there for ages (LaPiere, 1959), it has been especially active in the United States since 1930. First, an attack was made on competitive grading. As a result, some schools abolished examinations and grades altogether. Others shifted to some type of evaluation presumed to be "non-competitive." Perhaps the most favored of these practices has been comparison or competition with one's own performance, or evaluation in terms of the extent to which one was "over- or underachieving" -- usually in terms of the intelligence quotient. Next, according to LaPiere (1959), there was an attempt to eliminate competition in any form from the classroom. Advocates of this noncompetitive society argued that it was necessary to eliminate competition from education and to develop a generation of noncompetitive adults in order to bring about "the good society." Thus, the current relative silence concerning competition is of interest in itself.

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[1] I was assisted in preparing this chapter by Dr. P. R. Krishnaiah.

Procedures

Data concerning the competitive (not practiced) condition in the earlier study were re-analyzed in the present study. Children assigned to this condition served as a control group in the earlier study and one-fourth of the pupils enrolled in each class were assigned randomly to the condition. After being given the general orientation concerning the activity and assigned to this group, these subjects went directly to the testing situation. Their task was to think of as many ideas as they could for improving a stuffed toy dog so that it would be more fun to play with. In the first three grades, subjects were tested individually and orally and the examiner wrote down their responses. In the upper three grades, subjects were tested in a group and were required to write their ideas. In all cases, the time limit was eight minutes.

In another school where the average intelligence quotient is almost identical to that found in the school in the first study, the practiced (not competition) condition was conducted. As a part of the orientation, the entire class in all grades was asked to think of ideas for improving a toy fire truck so that it would be "more fun for children to play with." Testing procedures were the same as in the other condition.

A total of 199 subjects were involved in the competitive (not practiced) condition and 356 in the practiced (not competitive) condition. The tests under competitive conditions were administered in December and in the other condition in February.

Responses to the test task were scored for the number of ideas (fluency) and the number of principles or approaches used (flexibility) in improving the toy. Following the scoring manual, an interscorer reliability of .93 was obtained between the two judges.

To illustrate the scoring procedure, let us take six responses from the record of a third grade boy:

1. Give him feet that would go round so that as he moves he would dig a hole.
2. Make his tail longer.
3. Put a hero medal on him or a medal he won at a dog show.

4. Put a tiny tape recorder inside him so that what you say is recorded in dog language so he can answer you.
5. Put fleas on him -- or flies.
6. Hook him up so that he can drink water from a bowl and so it will run down through a little tube and run back in the bowl and won't mess things up.

Each response received a point for fluency (score equals six), since all are relevant and involve potential improvements which would enhance a child's enjoyment of the toy. The first response illustrates the principle of "giving sensory appeal" (motion); the second, "magnification"; the third, "addition"; the fourth, "addition"; the fifth, "addition"; and the sixth, "combination." Thus, he received a score of four on flexibility.

The mean fluency scores on the Product Improvement Task under the competitive (not practiced) and the practiced (not competitive) are presented in Table 13.1 by grade and sex. It will be noted from this table that there is a general tendency for subjects in the competitive condition to give more responses than those in the other condition. This tendency is consistent except for girls in the second and boys in the fifth and sixth grades. A number of sex differences are also observed and there are also some indications that boys and girls at different grade levels may respond differently to competition and practice as used in this study.

Table 13.1

Mean Fluency Scores on Product Improvement Task Under Competitive (Not Practiced) and Practiced (Not Competitive) Conditions by Grade and Sex

Grade and Condition	Number			Means		
	Boys	Girls	Total	Boys	Girls	Total
First Competitive (NP)	19	16	35	10.95	11.50	11.20
First Practiced (NC)	30	26	56	8.37	6.27	7.39
Second Competitive (NP)	22	20	42	11.50	8.45	10.05
Second Practiced (NC)	38	16	54	9.84	9.00	9.59
Third Competitive (NP)	17	15	32	17.65	13.67	15.78
Third Practiced (NC)	22	21	43	11.41	8.67	10.07
Fourth Competitive (NP)	20	11	31	9.50	8.46	9.13
Fourth Practiced (NC)	39	35	74	6.46	7.31	6.86
Fifth Competitive (NP)	21	15	36	7.76	11.40	9.28
Fifth Practiced (NC)	32	24	56	10.66	11.29	10.93
Sixth Competitive (NP)	15	21	36	8.67	13.13	10.22
Sixth Practiced (NC)	27	46	73	10.48	10.96	10.78

The effects observed in Table 13.1 were tested for significance by analysis of variance and the results are presented in Table 13.2. It

Table 13.2

Analysis of Variance Data to Test Significance of Effects of Competitive (Not Practiced) and Practiced (Not Competitive) Conditions and Sex on Fluency Scores on Product Improvement Task by Grades

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
First	Sex	1	26.3574	0.6464	Not Signif.
	Group (C&P)	1	310.9072	7.6258	<.01
	Interaction	1	37.5702	0.9215	Not Signif.
	Error	87	40.7704		
Second	Sex	1	76.6273	2.8501	Not Signif.
	Group (C&P)	1	34.3251	1.2767	Not Signif.
	Interaction	1	6.6611	0.2477	Not Signif.
	Error	92	26.8858		
Third	Sex	1	200.0471	4.7997	<.05
	Group (C&P)	1	584.8956	14.0334	<.01
	Interaction	1	7.0127	0.1682	Not Signif.
	Error	71	41.6788		
Fourth	Sex	1	2.7037	0.1774	Not Signif.
	Group (C&P)	1	114.4688	7.5124	<.01
	Interaction	1	18.4666	1.2119	Not Signif.
	Error	101	15.2372		
Fifth	Sex	1	75.2648	4.2787	<.01
	Group (C&P)	1	59.4228	3.3781	Not Signif.
	Interaction	1	46.8351	2.6625	Not Signif.
	Error	88	17.5904		
Sixth	Sex	1	44.1893	2.5237	Not Signif.
	Group (C&P)	1	0.4502	0.0257	Not Signif.
	Interaction	1	63.3543	3.6183	<.10
	Error	105	3.6916		

will be noted that the effects due to competition are significant in the first, third, and fourth grades, but not in the second, fifth and sixth. The sex effects are significant in the third and fifth grades with boys excelling girls in the third and the reverse occurring in the fifth. The interaction effects approach but do not reach statistical significance in the fifth and sixth grades.

The mean flexibility scores by condition, grade, and sex are shown in Table 13.3. Again it will be observed that there is a general trend for subjects under the competitive conditions to excel those in the

Table 13.3

Mean Flexibility Scores on Product Improvement Task Under Competitive (Not Practiced) and Practiced (Not Competitive) Conditions by Grade and Sex

Grade and Condition	Number Boys	Girls	Total	Mean Boys	Girls	Total
First Competitive (NP)	19	16	35	4.32	4.63	4.46
First Practiced (NC)	30	26	56	4.23	3.46	3.88
Second Competitive (NP)	22	20	42	5.18	4.45	4.93
Second Practiced (NC)	38	16	54	3.86	3.69	3.79
Third Competitive (NP)	17	15	32	5.59	5.53	5.56
Third Practiced (NC)	22	21	43	4.73	4.90	4.81
Fourth Competitive (NP)	20	11	31	4.90	4.91	4.90
Fourth Practiced (NC)	39	35	74	3.26	4.14	3.68
Fifth Competitive (NP)	21	15	36	4.38	6.07	5.08
Fifth Practiced (NC)	32	24	56	4.38	4.79	4.55
Sixth Competitive (NP)	15	21	36	5.07	6.00	5.39
Sixth Practiced (NC)	27	46	73	4.96	5.67	5.42

other condition. The data concerning the analyses of variance to test the significance of the observed effects of conditions and sex are presented in Table 13.4. It will be observed that the competitive

Table 13.4

Analysis of Variance Data to Test Significance of Effects of Competitive (Not Practiced) and Practiced (Not Competitive) Conditions and Sex on Flexibility Scores on Product Improvement Task Grades

Grade	Source Variance	Degrees Freedom	Mean Squares	F-ratio	Level of Significance
First	Sex	1	2.8757	0.7154	Not Signif.
	Group (C&P)	1	7.2351	1.8000	Not Signif.
	Interaction	1	6.2515	1.5553	Not Signif.
	Error	87	4.0193		
Second	Sex	1	5.6608	1.2379	Not Signif.
	Group (C&P)	1	27.7761	6.0743	<.05
	Interaction	1	1.6904	0.3696	Not Signif.
	Error	92	4.5727		
Third	Sex	1	0.1162	0.0259	Not Signif.
	Group (C&P)	1	10.3186	2.3036	Not Signif.
	Interaction	1	0.2467	0.5500	Not Signif.
	Error	71	4.4792		
Fourth	Sex	1	10.5500	3.7463	Not Signif.
	Group (C&P)	1	36.6823	13.0259	<.01
	Interaction	1	3.9448	1.4008	Not Signif.
	Error	101	2.8161		

Table 13.4: cont

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
Fifth	Sex	1	18.6421	4.0273	<.05
	Group (C&P)	1	6.4034	1.3833	Not Signif.
	Interaction	1	8.6028	1.8584	Not Signif.
	Error	88	4.6289		
Sixth	Sex	1	13.5175	3.6616	Not Signif.
	Group (C&P)	1	0.5742	0.1555	Not Signif.
	Interaction	1	0.1606	0.0435	Not Signif.
	Error	105	3.6916		

condition produced superior flexibility scores only in the second and fourth grades. Sex differences are statistically significant only in the fifth grade, with girls scoring higher than boys.

Discussion

The results presented herein concerning the relative effectiveness of competition without practice and practice without competition are far from conclusive. Since there is a fairly general tendency for almost all groups under competitive conditions to achieve somewhat higher scores than the other groups and since the time lag between the administration of the tests to the two groups favored the practice condition, one must admit that the argument in favor of competition is fairly strong. When these results are compared with those found in the earlier study, it is clear that the practice (or the "warm-up" resulting from practice) does much to compensate for the difference between performance under competitive and noncompetitive conditions. It should be emphasized that this study makes no attempt to tell us anything about the cumulative effects of competition on creative behavior.

It is unfortunate that there was a two-month lag between the collection of the data under the two conditions. Such data collection requires a great deal of manpower since children in the first three grades must be tested individually and arrangements for such studies are rather complex. Since growth of the abilities measured by this task are far from linear, it would be risky to attempt to correct for this lag. In fact, there is no measureable growth between grades at some levels. It is not believed that this time lag affected the results very much.

Summary

A previous study indicated that the use of competition in the form of prizes resulted in a much larger number and greater flexibility of responses on the Product Improvement Task than conditions identical except for the absence of competition. The present study was conducted to determine whether or not the learning and/or "warm-up" effects resulting from a brief practice session would "make up" for this difference which seems to result from the introduction of competition. One hundred and ninety-nine children from first through sixth grades were involved in the competitive (but not practiced) condition and 356, in the practiced (but not competitive) conditions.

There was a fairly consistent tendency for children under competitive conditions to excel those under the other condition. On the measure of fluency, however, the results are statistically significant only in the first, third, and fourth grades. On the measure of flexibility, the results are statistically significant in the second and fourth grades. Thus, it was concluded that the practice and "warm-up" did not completely compensate for the stimulating effects of competition but that it did a great deal to reduce the difference between the results under competitive and noncompetitive conditions found in the earlier study.

Chapter 14[1]

UNEVALUATED PRACTICE AND CREATIVE BEHAVIOR

In most school situations that I have observed, children are seldom free for a moment from evaluation. Adults and/or peers constantly and unrelentingly watch children as they attempt to learn and think and correct their every error. In many instances, extravagant efforts are made to prevent children from making any errors in their learning and thinking. They are prevented from making any but the tiniest leaps in thinking, producing the most obvious, safest, and surest responses. It is my fear that such conditioning binds a child in this thinking and makes him afraid to experiment, to guess, and to learn how to identify and correct his own errors. As stated in Chapters 5 and 6, it is my hypothesis that children need a period during which they can experiment, make mistakes, and test various approaches without fear of evaluation and the failure that making a mistake implies.

In the classroom and in textbooks for teachers we find a wide range of attitudes concerning the freedom allowed children in determining what they shall do, especially in the realm of creative activities. Some teachers prescribe and evaluate every move the child makes. Others go to the other extreme of leaving the child free to do whatever he likes and merely encourage him to "express himself." One of the extremes of lack of freedom is illustrated in the following description by Hayes B. Jacobs (1961) of his early art instruction:

> "First she came to school with something already drawn. A Thanksgiving turkey, let's say, or a Christmas tree, or an Easter bunny. It was drawn on squared paper. She would hold it up in front of the class and say: 'This is what we will draw this afternoon.' Then she would pass out the paper, counting one squared sheet to a pupil and handing a stack to a monitor in the front seat of each row. 'Pass it back, monitors,' she would say. 'Each pupil just take one sheet.'
>
> "When each of us had paper, she would say: 'Now, count down eighteen squares from the top left corner of your paper, and make a dot. Hold it up, then, so we can see it.' We would all hold our paper up except old Wesley Coggeshell, who was slow, and had ringworm besides. 'Hurry up, Wesley,' she would say.
>
> "Finally we would be ready. 'All right now,' she would say, 'count ten squares over, then start your line. Draw your lines up three squares. Now over six squares. Now down twelve. Now over seventeen. Now six down, five over, ten down, eight over ...etc.'
>
> "When we were all through, if we had done it right, we would have a nice picture of something. 'Put your names on your papers and pass them to the front,' the teacher would say. 'Monitors, stack them in neat stacks.'

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[1] Dr. Dietmar P. Schenitzki prepared most of the analyses and the preliminary draft for this chapter.

> "Next day, to our delight, all of our pictures would be displayed on the wall above the blackboard. They all looked exactly alike and all very good except old Wesley Coggeshell's. His would look simply awful. What a dumbbell!"

Most recent writers in the field of art education have deplored the rigid and dictated methods of Hayes B. Jacob's teacher as well as those of the teacher who permits children to do whatever they want to do and merely encourages them to express themselves. Gibbs (1958) expresses this view in criticizing the extreme freedom approach as leaving children to flounder without help or criticism. She admits that freedom to paint what the child wants to paint provides a great outlet for the primary child but that without direction and constructive criticism from the teacher, the average child will cease to develop and will become discouraged.

A number of apparently successful teachers have attempted to describe their own strategies and techniques for maintaining this balance between rigid and dictated methods on the one hand and undirected freedom on the other. One of the techniques described by Natalie Robinson Cole is to reinforce individuality of style. She would say (Cole, 1940, p. 7): "Make your pictures your own way, Theresa. Don't ever try to paint like anyone else. We want to be able to look at your picture and say, 'That's Theresa's picture.'" She believes that the teacher should go about lifting one picture after another, giving some appreciation. She cautions that the other children may not lift their eyes from their own paintings but that this will make them strive to do as much or better.

Anderson (1960) believes that external evaluation by the teacher becomes damaging to creative growth because the teacher exercises power or control over the child. Grades, rewards and punishments, praise and reproof are some of the ways in which external evaluation and power over are combined. This makes it difficult for children to learn to think for themselves and makes them content with rewards and approval as substitutes for the satisfactions of intrinsic and meaningful originality. Children, Anderson argues, are also taught to avoid punishment and reproof and this must often be done by sham, pretense, falseness, and a stifling kind of conformity.

It will be recalled from the study described in the preceding chapter that too frequent evaluation, regardless of its nature, seemed to interfere with creative exploration and the initiation of ideas. In the study described in this chapter, an effort has been made to extend this finding one step further by freeing children entirely from evaluation during the practice period. In the other condition, an effort was made to offer the most intelligent kind of evaluation we were capable of giving, not intervening too frequently but giving directions and suggestions as they seemed appropriate. We believed that this would enable us to assess whether children, having experienced a period of no evaluation but encouragement for free experimentation and exploration, will do better creative work on a set of tasks than children, having experienced a period of constructive, positive evaluation.

Procedures

General

This classroom experiment was conducted in a Minneapolis public elementary school and involved the total enrollment of the school from grade one through six. In an introductory period prior to the experiment, procedures and instructions were introduced which attempted to provide a brief orientation to the children concerning what they would be expected to do and to arouse the motivation of the children. They were told that we would like to have their help in learning how people develop interesting unusual, original, and well-worked-out ideas. They were told that a prize would be awarded to each of the three pupils who produced the most interesting and unusual ideas in the tasks which they would be given.

The experimenters explained that there would be two different tasks and that before each task they would be given a practice task during which they would have a chance to learn how to produce interesting, unusual, and well-developed ideas. Following these orientation procedures and the more specific instructions which varied with the two experimental treatments, the materials for the first five-minute practice-task were distributed. After the practice task involving the experimental manipulations described below, the children began the main task. The second task was administered in the same manner.

Experimental Tasks

The Incomplete Figures Tasks, Forms A and B. The material for the first practice task consisted of six incomplete figures on a single sheet of paper. This sheet was divided into six squares, each 2 x 2 inches (See page 14-232 for figure 14.1). For the test task, an alternate set of incomplete figures (See page 14-233 for Figure 14.2) was used. These figures were adapted from those developed by Kate Franck and described by Barron (1958).

Subjects were told that it was their task to think of pictures or objects they could make from these incomplete figures, as follows:

> "By adding lines to the six figures on your sheet, sketch some object or picture. Try to think of some object or picture that no one else in the class will think of. Try to put as many ideas as you can into your drawings and make them tell as interesting and as complete a story as you can. In other words, do not stop with your first idea for completing the figure; keep building onto it."

At the beginning of the practice session, the experimenter placed on the blackboard three examples for the first figure (a ladder, an apartment house, and an object suggested by someone in the class).

Picture Construction or Shape Task (Triangle and Curved Shaped). The materials for the second test task consisted of three sheets of paper about 6x9 inches, three differently colored curved shape pieces of paper, and a bottle of glue for each subject. For the practice session, subjects

Figure Form A

Name______________________________ Date________________

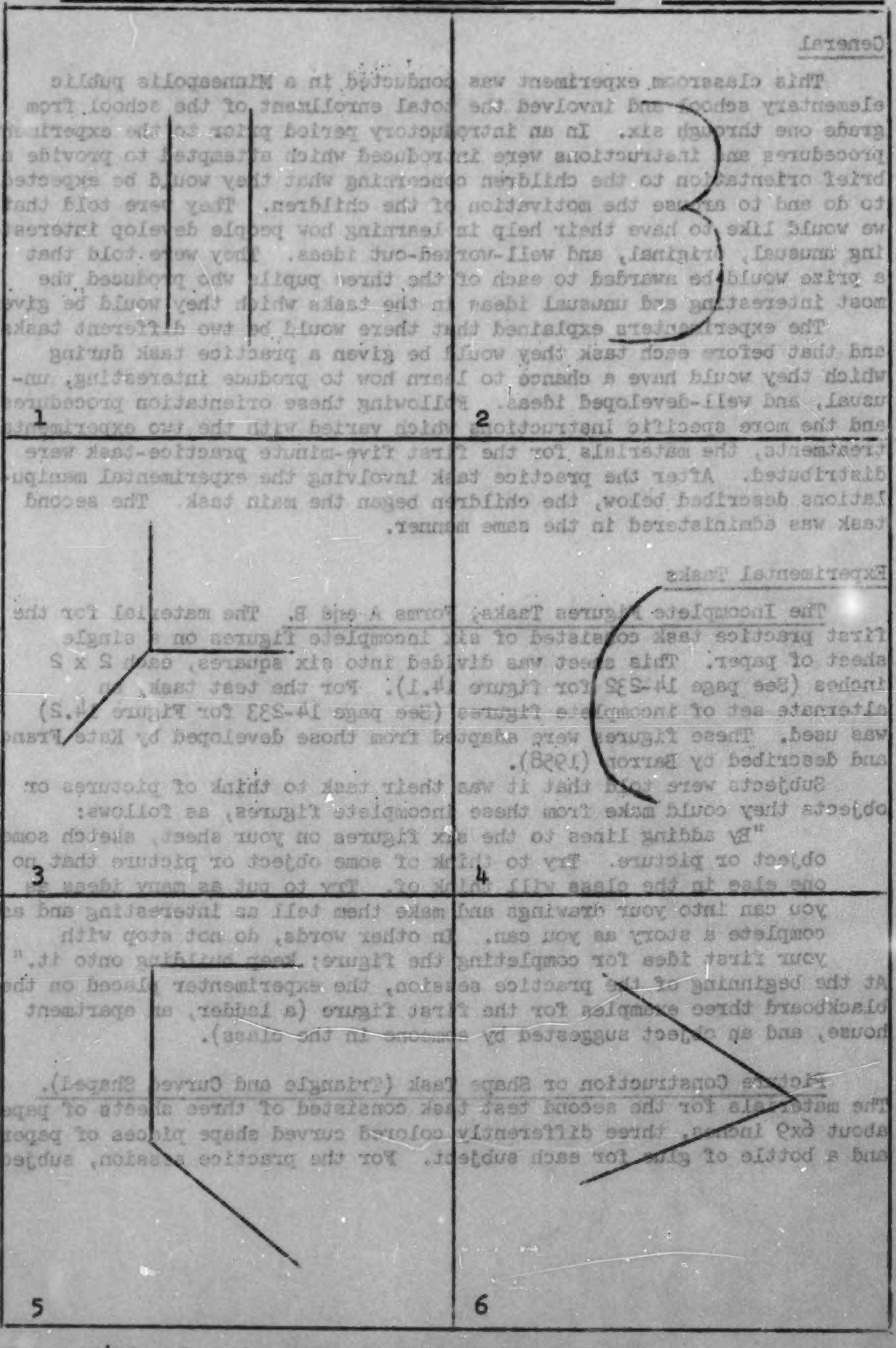

Figure 14.1. Practice Task, Incomplete Figures, Form A

Figure Form B

Name ______________________________ Date ______________

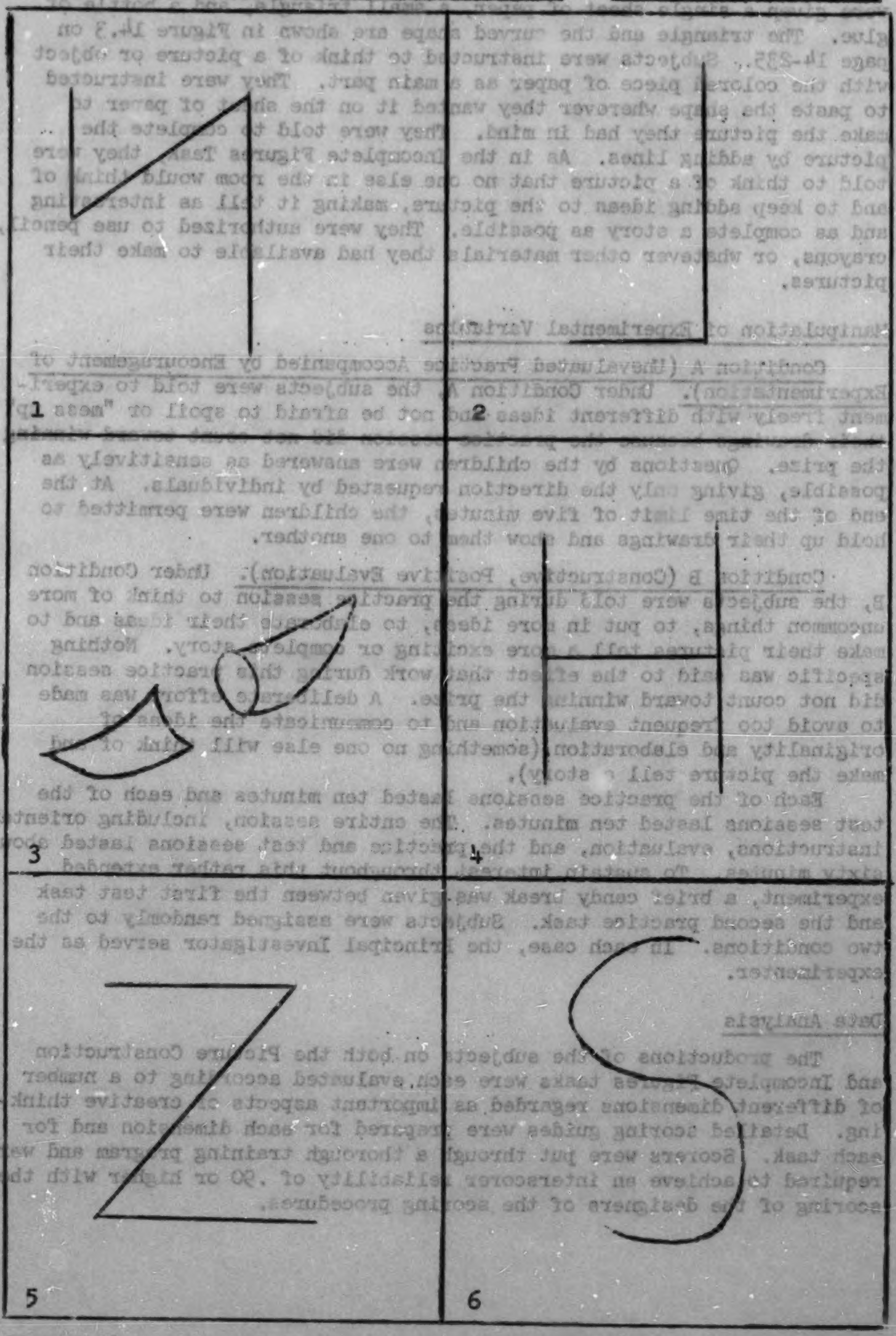

Figure 14.2. Test Task, Incomplete Figures, Form B

were given a single sheet of paper, a small triangle, and a bottle of glue. The triangle and the curved shape are shown in Figure 14.3 on page 14-235. Subjects were instructed to think of a picture or object with the colored piece of paper as a main part. They were instructed to paste the shape wherever they wanted it on the sheet of paper to make the picture they had in mind. They were told to complete the picture by adding lines. As in the Incomplete Figures Task, they were told to think of a picture that no one else in the room would think of and to keep adding ideas to the picture, making it tell as interesting and as complete a story as possible. They were authorized to use pencil, crayons, or whatever other materials they had available to make their pictures.

Manipulation of Experimental Variables

Condition A (Unevaluated Practice Accompanied by Encouragement of Experimentation). Under Condition A, the subjects were told to experiment freely with different ideas and not be afraid to spoil or "mess up" their drawings because the practice session did not count toward winning the prize. Questions by the children were answered as sensitively as possible, giving only the direction requested by individuals. At the end of the time limit of five minutes, the children were permitted to hold up their drawings and show them to one another.

Condition B (Constructive, Positive Evaluation). Under Condition B, the subjects were told during the practice session to think of more uncommon things, to put in more ideas, to elaborate their ideas and to make their pictures tell a more exciting or complete story. Nothing specific was said to the effect that work during this practice session did not count toward winning the prize. A deliberate effort was made to avoid too frequent evaluation and to communicate the ideas of originality and elaboration (something no one else will think of and make the picture tell a story).

Each of the practice sessions lasted ten minutes and each of the test sessions lasted ten minutes. The entire session, including orientation, instructions, evaluation, and the practice and test sessions lasted about sixty minutes. To sustain interest throughout this rather extended experiment, a brief candy break was given between the first test task and the second practice task. Subjects were assigned randomly to the two conditions. In each case, the Principal Investigator served as the experimenter.

Data Analysis

The productions of the subjects on both the Picture Construction and Incomplete Figures tasks were each evaluated according to a number of different dimensions regarded as important aspects of creative thinking. Detailed scoring guides were prepared for each dimension and for each task. Scorers were put through a thorough training program and were required to achieve an interscorer reliability of .90 or higher with the scoring of the designers of the scoring procedures.

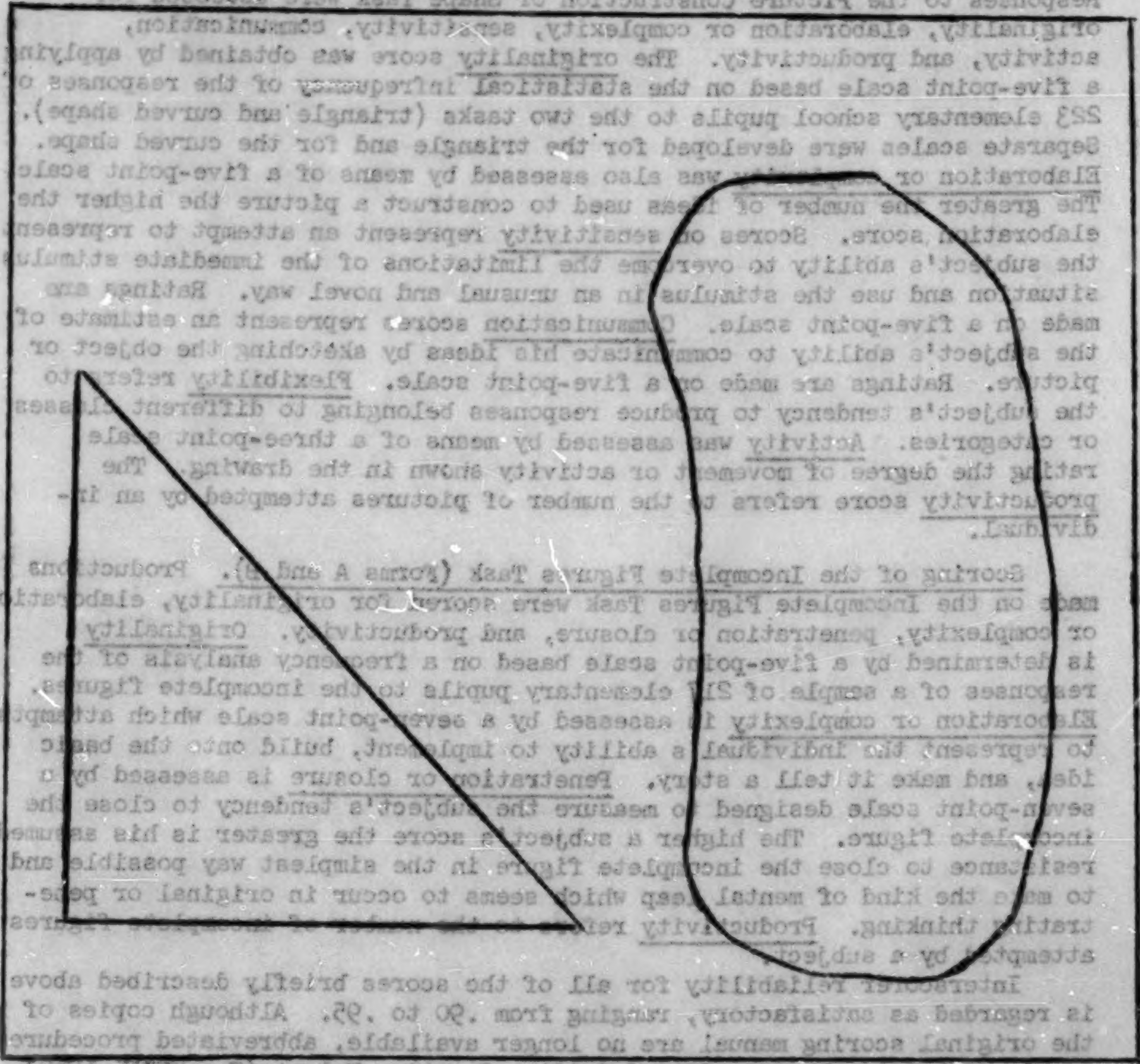

Figure 14.3. Triangle and Curved Shape Forms Used in Picture Construction Task

Scoring of the Picture Construction Task (Triangle and Curved Shape). Responses to the Picture Construction or Shape Task were assessed for originality, elaboration or complexity, sensitivity, communication, activity, and productivity. The originality score was obtained by applying a five-point scale based on the statistical infrequency of the responses of 223 elementary school pupils to the two tasks (triangle and curved shape). Separate scales were developed for the triangle and for the curved shape. Elaboration or complexity was also assessed by means of a five-point scale. The greater the number of ideas used to construct a picture the higher the elaboration score. Scores on sensitivity represent an attempt to represent the subject's ability to overcome the limitations of the immediate stimulus situation and use the stimulus in an unusual and novel way. Ratings are made on a five-point scale. Communication scores represent an estimate of the subject's ability to communicate his ideas by sketching the object or picture. Ratings are made on a five-point scale. Flexibility refers to the subject's tendency to produce responses belonging to different classes or categories. Activity was assessed by means of a three-point scale rating the degree of movement or activity shown in the drawing. The productivity score refers to the number of pictures attempted by an individual.

Scoring of the Incomplete Figures Task (Forms A and B). Productions made on the Incomplete Figures Task were scored for originality, elaboration or complexity, penetration or closure, and productivity. Originality is determined by a five-point scale based on a frequency analysis of the responses of a sample of 217 elementary pupils to the incomplete figures. Elaboration or complexity is assessed by a seven-point scale which attempts to represent the individual's ability to implement, build onto the basic idea, and make it tell a story. Penetration or closure is assessed by a seven-point scale designed to measure the subject's tendency to close the incomplete figure. The higher a subject's score the greater is his assumed resistance to close the incomplete figure in the simplest way possible and to make the kind of mental leap which seems to occur in original or penetrating thinking. Productivity refers to the number of incomplete figures attempted by a subject.

Interscorer reliability for all of the scores briefly described above is regarded as satisfactory, ranging from .90 to .95. Although copies of the original scoring manual are no longer available, abbreviated procedures are described in the appendix of Guiding Creative Talent (Torrance, 1962) and revised scoring guides are available in more recent manuals.

Results

Picture Construction Test

Since the purpose of the experiment described herein was to determine which of the two evaluative conditions under study produce the more creative behavior following practice, the criterion measures used in the evaluation are the raw scores resulting from the scoring of the test tasks without reference to any pre-test or practice scores. It did not seem fair to use the practice scores as pre-test scores, since the evaluative practice involved what might be considered a type of coaching of a fairly direct nature.

The means and standard deviations of the total scores derived from the Picture Construction Test by sex and grade are presented in Table 14.1.

Table 14.1

Means and Standard Deviations of Total Scores on Picture Construction Test by Sex and Grade Under Unevaluated (A) and Positively Evaluated (B) Conditions

Grade	Condition	Number		Boys		Girls	
		Boys	Girls	Means	St. Dev.	Means	St. Dev.
1	A	13	15	25.15	8.88	27.47	5.59
	B	14	15	26.50	4.82	28.14	4.67
2	A	15	14	26.13	11.05	23.29	8.19
	B	14	16	27.07	5.04	24.31	6.85
3	A	12	9	37.67	5.98	35.78	1.70
	B	15	18	25.87	8.98	26.06	6.50
4	A	7	11	36.43	2.64	33.09	6.67
	B	16	22	20.94	8.93	26.68	6.50
5	A	12	15	29.08	3.99	30.80	4.92
	B	11	8	29.91	9.81	31.56	8.76
6	A	16	19	35.44	7.77	34.42	4.65
	B	6	7	30.33	7.87	39.33	3.33

It will be noted that both boys and girls in grades three and four under the unevaluated condition excel their same sex peers under the evaluated condition. The results at other grade levels, however, are less consistent. Under the unevaluated condition, there are slight advantages for first grade girls and sixth grade girls. Under evaluated conditions, there are similar advantages for first grade boys, second grade boys and girls, fifth grade girls and boys, and sixth grade girls. It will be noted that the unevaluated condition tends to produce greater variability than the evaluated condition in the first and second grades but that the reverse occurs in the third, fourth and fifth grades.

The analysis of variance data for testing the significance of the differences in mean total scores on the Picture Construction Test are presented in Table 14.2. It will be noted that the differences due to experimental condition are significant at the .001 level of confidence in both the third and fourth grades, both cases favoring the unevaluated

Table 14.2

Analysis of Variance Data to Test Significance of the Difference in Total Means by Sex Under Unevaluated (A) and Evaluated (E) Practice Conditions on the Picture Construction Test for the First Through Sixth Grades

Grade	Source of Variance	Degree of Freedom	Mean Squares	F-ratio	Level of Significance
1	Conditions	1	60.1533	2.85	< .10
	Sex	1	121.2028	5.75	< .05
	Interaction	1	157.1161	7.44	< .01
	Error	53	21.1157		
2	Conditions	1	9.1633	0.12	NS
	Sex	1	125.8358	1.71	< .20
	Interaction	1	0.0625	0.00	NS
	Error	55	73.5383		
3	Conditions	1	1481.7614	27.19	< .001
	Sex	1	5.0085	0.09	NS
	Interaction	1	13.6973	0.24	NS
	Error	50	56.5769		
4	Conditions	1	1289.6420	25.40	< .001
	Sex	1	154.3857	3.04	< .10
	Interaction	1	281.9309	5.55	< .05
	Error	52	50.7686		
5	Conditions	1	6.4283	0.13	NS
	Sex	1	18.3317	0.37	NS
	Interaction	1	3.1067	0.06	NS
	Error	42	49.3782		
6	Conditions	1	1.6581	0.04	NS
	Sex	1	21.3233	0.52	NS
	Interaction	1	177.4875	4.36	< .05
	Error	44	40.7260		

condition. Differences due to sex are significant in the first grade in favor of girls and in the fourth grade in favor of boys. In both cases, however, the interaction between sex and conditions is statistically significant, first grade girls tending to do proportionately better under unevaluated conditions and fourth grade girls tending to do proportionately better under evaluated conditions. Sixth grade girls also tend to do proportionately better under evaluated than under unevaluated conditions.

Means and standard deviations of the originality scores on the Picture Construction Test are presented in Table 14.3. It will be noted that fourth grade boys tend to produce more original ideas under unevaluated

Table 14.3

Means and Standard Deviations of Originality Scores on Picture Construction Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Condition	Number		Boys		Girls	
		Boys	Girls	Means	St. Dev.	Means	St. Dev.
1	A	13	15	2.62	1.44	3.93	2.30
	B	14	15	4.07	2.37	4.93	1.64
2	A	15	14	3.67	2.52	4.57	3.36
	B	14	16	5.07	2.02	4.94	2.52
3	A	12	9	7.25	2.68	1.89	0.87
	B	15	18	4.07	2.60	4.28	2.19
4	A	7	11	6.57	2.99	3.91	2.30
	B	16	22	4.31	3.05	4.32	2.40
5	A	12	15	6.17	2.26	5.00	3.27
	B	11	8	3.82	2.60	5.50	2.62
6	A	16	19	4.38	3.33	3.32	1.83
	B	6	7	5.17	1.78	5.29	1.93

than under evaluated conditions. In the first, second and sixth grades, both sexes tend to produce more original ideas under evaluated than under unevaluated conditions. In the third and fifth grades, boys tend to be more original under unevaluated conditions and there is a tendency for the reverse to occur for third and fifth grade girls. Thus, in five of six cases girls tend to perform better under evaluated than under unevaluated conditions while this occurs for boys in only three of six cases.

Data for testing the significance of the differences in means observed in Table 14.3 are presented in Table 14.4. The only clearly significant

Table 14.4

Analysis of Variance Data to Test Significance of Effects of Unevaluative (A) and Evaluative (B) Practice Conditions on Originality Scores on the Picture Construction or Shape Task for Grades 1 - 6

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
	Conditions	1	11.5201	2.88	< .10
1	Sex	1	25.5582	6.38	< .05
	Interaction	1	3.8526	0.96	NS
	Error	53	4.0034		
	Conditions	1	11.3243	1.48	NS
2	Sex	1	2.0750	0.27	NS
	Interaction	1	3.9828	0.52	NS
	Error	55	7.6498		

Table 14.4: cont.

Grade	Source of Variance	Degree of Freedom	Mean Squares	F-ratio	Level of Significance
3	Conditions	1	3.7461	0.69	NS
	Sex	1	50.1262	9.29	<.01
	Interaction	1	98.0515	18.18	<.001
	Error	50	5.3936		
4	Conditions	1	42.1019	5.97	<.05
	Sex	1	0.5708	0.08	NS
	Interaction	1	1.3055	0.18	NS
	Error	52	7.0545		
5	Conditions	1	10.7830	1.36	NS
	Sex	1	0.0000	0.00	NS
	Interaction	1	22.1771	2.79	<.20
	Error	42	7.9357		
6	Conditions	1	19.3189	2.95	<.10
	Sex	1	6.5209	1.00	NS
	Interaction	1	3.2642	0.50	NS
	Error	44	6.5481		

difference due to experimental conditions occurs in the fourth grade in favor of the unevaluated condition. The differences in the first and sixth grades approach statistical significance and are both in favor of the evaluated condition. Significant differences due to sex occur in the first and third grades, favoring girls in the first grade and boys in the third grade. Interaction is significant only in the third grade, with boys performing better under unevaluated conditions and girls, under evaluated conditions.

The means and standard deviations for the elaboration scores of the Picture Construction Test are presented in Table 14.5. Here, it will be

Table 14.5

Means and Standard Deviations of Elaboration Scores of Picture Construction Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

		Number		Boys		Girls	
Grade	Condition	Boys	Girls	Means	St. Dev.	Means	St. Dev.
1	A	13	15	5.31	1.85	6.00	1.79
	B	14	15	4.50	1.70	4.33	2.10
2	A	15	14	5.07	2.64	4.64	1.96
	B	14	16	4.71	1.59	3.62	1.78
3	A	12	9	6.83	2.28	8.56	1.22
	B	15	18	3.80	2.31	4.72	1.93
4	A	7	11	6.86	1.57	6.09	2.07
	B	16	22	3.06	1.88	4.41	2.08
5	A	12	15	4.17	1.81	6.80	2.14
	B	11	8	6.45	1.86	4.38	1.33
6	A	16	19	6.19	2.32	6.00	1.78
	B	6	7	5.83	1.83	8.43	2.14

noted that there is a consistent tendency in the first four grades for both boys and girls to show greater elaboration under unevaluated conditions than under evaluated conditions. Fifth grade girls also tend to show greater elaboration under unevaluated conditions but fifth grade boys and sixth grade boys and girls show a reversal of this trend.

Table 14.6 presents the data for testing the differences in means

Table 14.6

Analysis of Variance Data to Test Significance of Effects of Unevaluative (A) and Evaluative (B) Practice Conditions on Elaboration (complexity) Scores on the Picture Construction or Shape Task

Grade	Source of Variance	Degree of Freedom	Mean Squares	F-ratio	Level of Significance
	Conditions	1	40.2273	16.48	<.001
1	Sex	1	6.2851	2.57	< .20
	Interaction	1	10.8792	4.46	< .05
	Error	53	2.4417		
	Conditions	1	7.0058	1.61	NS
2	Sex	1	8.5321	1.97	<.20
	Interaction	1	1.6285	0.38	NS
	Error	55	4.3409		
	Conditions	1	147.4899	34.48	<.001
3	Sex	1	20.1893	4.72	< .05
	Interaction	1	2.0230	0.47	NS
	Error	50	4.2730		
	Conditions	1	77.7963	20.02	<.001
4	Sex	1	6.2450	1.61	NS
	Interaction	1	13.0614	3.36	<.10
	Error	52	3.8551		
	Conditions	1	0.0208	0.01	NS
5	Sex	1	5.5108	1.50	NS
	Interaction	1	60.6993	16.48	<.001
	Error	42	3.6826		
	Conditions	1	12.4801	2.85	<.10
6	Sex	1	3.8302	0.87	NS
	Interaction	1	18.2473	4.16	<.05
	Error	44	4.3860		

observed in Table 14.5. The observed differences due to experimental conditions are significant at the .001 level in the first, third, and fourth grades. Only in the third grade are the differences due to sex significant, in this case in favor of girls. This latter result is of special interest since third grade boys excelled third grade girls on originality in this same task. Interaction between sex and condition is statistically significant in the first, fifth, and sixth grades, and approaches significance in the fourth grade. The unevaluated conditions appear to favor disproportionately first grade girls, fourth grade boys, fifth grade girls, and sixth grade boys.

Incomplete Figures Test

Means and standard deviations of the total scores on the Incomplete Figures Test are presented in Table 14.7 by sex, grade, and experimental condition. In the first four grades, both boys and girls tend to perform more creatively on the Incomplete Figures Test under unevaluated than under evaluated conditions. This is also true of fifth grade girls and sixth grade boys.

Table 14.7

Means and Standard Deviations of Total Scores on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Condition	Number Boys	Number Girls	Boys Means	Boys St. Dev.	Girls Means	Girls St. Dev.
1	A	13	14	30.9	13.0	31.9	5.5
	B	14	15	26.1	8.6	29.3	10.0
2	A	14	15	38.0	19.2	29.1	8.0
	B	13	16	20.2	11.8	23.1	9.6
3	A	12	9	33.0	10.3	27.4	9.0
	B	15	16	21.1	10.0	22.2	7.8
4	A	7	11	36.0	7.4	26.1	16.0
	B	16	22	34.1	6.0	34.7	6.0
5	A	12	19	34.3	7.3	41.6	5.7
	B	11	8	39.6	11.6	33.0	11.7
6	A	16	19	43.5	11.2	47.3	8.7
	B	6	7	33.3	7.2	49.4	7.9

Table 14.8 presents the data for testing the significance of the

Table 14.8

Analysis of Variance Data to Test Significance of Difference in Mean Total Score on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Source of Variation	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
1	Condition	1	193.24	2.0962	NS
	Sex	1	64.01	0.6943	NS
	Interaction	1	16.74	0.1816	NS
	Error	52	92.19		
2	Condition	1	1909.48	11.8107	<.01
	Sex	1	130.55	0.8075	NS
	Interaction	1	510.66	3.1586	NS
	Error	54	161.67		

Table 14.8: cont.

Grade	Source of Variance	Degrees of Freedom	Means Squares	F-ratio	Level of Significance
3	Condition	1	962.96	11.1691	<.01
	Sex	1	32.33	0.3750	NS
	Interaction	1	135.00	1.5659	NS
	Error	48	86.22		
4	Condition	1	102.37	1.2706	NS
	Sex	1	237.81	2.9517	NS
	Interaction	1	320.54	3.9786	<.10
	Error	52	80.57		
5	Condition	1	29.72	0.3959	NS
	Sex	1	44.04	0.5865	NS
	Interaction	1	540.52	7.1986	<.01
	Error	46	75.09		
6	Condition	1	122.68	1.3945	NS
	Sex	1	592.93	6.7397	<.05
	Interaction	1	362.34	4.1187	<.05
	Error	44	87.98		

differences in means observed in Table 14.7. The differences due to experimental conditions are significant at the .01 level in the second and third grades but do not reach the .05 level of confidence in the other grades. Only in the sixth grade are differences due to sex significant, in this case in favor of boys. Interaction is statistically significant in both the fifth and sixth grades, with fifth grade girls and sixth grade girls enjoying disproportionate advantages from the unevaluated conditions.

Mean and standard deviation data relative to the originality scores of the Incomplete Figures Test are contained in Table 14.9.

Table 14.9

Means and Standard Deviations of Originality Scores on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Condition	Number		Boys		Girls	
		Boys	Girls	Means	St. Dev.	Means	St. Dev.
1	A	13	14	2.08	3.35	3.29	3.10
	B	14	15	5.71	2.43	6.07	3.49
2	A	14	15	7.93	5.51	5.73	3.06
	B	13	16	3.08	2.90	4.44	2.85
3	A	12	9	6.75	4.05	7.22	3.77
	B	15	16	4.07	2.81	4.56	3.10
4	A	7	11	7.29	2.87	9.55	6.12
	B	16	22	7.88	2.85	7.41	3.70
5	A	12	19	7.42	4.14	10.16	5.10
	B	11	8	8.45	3.88	6.38	4.41
6	A	16	19	6.69	4.61	7.47	4.39
	B	6	7	5.33	2.16	10.14	5.27

Both boys and girls in the second and third grades tend to produce more original ideas under unevaluated than under evaluated conditions with the reverse being true in the first and sixth grades. The unevaluated conditions also seem to favor fourth and fifth grade boys.

The analysis of variance data on originality of the Incomplete Figures Test are presented in Table 14.10. The experimental conditions

Table 14.10

Analysis of Variance Data to Test Significance of Difference in Mean Originality Scores on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
1	Condition	1	142.63	14.6117	<.01
	Sex	1	8.19	0.8389	NS
	Interaction	1	2.56	0.2623	NS
	Error	52	9.76		
2	Condition	1	126.11	9.0952	<.01
	Sex	1	2.62	0.1885	NS
	Interaction	1	45.56	3.2859	NS
	Error	54	13.87		
3	Condition	1	3.05	0.2667	NS
	Sex	1	88.75	7.7638	<.01
	Interaction	1	.01	.0019	NS
	Error	48	11.43		
4	Condition	1	2.11	0.1320	NS
	Sex	1	13.42	0.8375	NS
	Interaction	1	21.74	1.3568	NS
	Error	52	16.02		
5	Condition	1	20.70	1.0085	NS
	Sex	1	9.25	0.4507	NS
	Interaction	1	66.05	3.2182	NS
	Error	46	20.52		
6	Condition	1	6.33	0.3251	NS
	Sex	1	41.98	2.1571	NS
	Interaction	1	38.12	1.9585	NS
	Error	44	19.46		

appear to produce statistically significant differences in originality in the first and second grades. Only in the third grade is there a statistically significant sex difference, this time in favor of girls. Interaction is not statistically significant in any case.

Means and standard deviations of the elaboration scores are shown in Table 14.11. In the second, third, fourth, and sixth grades, boys show greater elaboration under unevaluated than under evaluated conditions. Only in the fifth grade, do girls tend to show greater elaboration under unevaluated than under evaluated conditions.

Table 14.11

Means and Standard Deviations of Elaboration Scores on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Condition	Number		Boys		Girls	
		Boys	Girls	Means	St. Dev.	Means	St. Dev.
1	A	13	14	3.69	4.53	2.64	2.98
	B	14	15	5.07	2.49	5.07	2.94
2	A	14	15	8.00	7.95	3.87	3.42
	B	13	16	3.54	2.47	4.12	2.25
3	A	12	9	5.33	3.17	3.22	2.33
	B	15	16	4.27	2.43	4.79	1.64
4	A	7	11	6.43	4.20	6.64	6.25
	B	16	22	5.62	2.00	6.77	2.00
5	A	12	19	6.25	1.96	8.58	1.54
	B	11	8	9.09	4.16	7.25	4.80
6	A	16	19	8.94	4.68	11.26	5.18
	B	6	7	8.00	0.89	11.43	1.99

Analysis of variance data to test the differences in means observed in Table 14.11 are shown in Table 14.12. Only in the first grade are the

Table 14.12

Analysis of Variance Data to Test Significance of Difference in Mean Elaboration Scores on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
1	Condition	1	51.55	4.7544	< .05
	Sex	1	3.61	0.3333	NS
	Interaction	1	2.56	0.2623	NS
	Error	52	9.76		
2	Condition	1	54.42	2.5898	NS
	Sex	1	45.91	2.1848	NS
	Interaction	1	80.27	3.8201	NS
	Error	52	21.01		
3	Condition	1	0.19	0.0335	NS
	Sex	1	10.21	1.7656	NS
	Interaction	1	12.76	2.2061	NS
	Error	48	5.78		

Table 14.12: cont.

Grade	Source of Variance	Degree of Freedom	Mean Squares	F-ratio	Level of Significance
4	Condition	1	0.70	0.0565	NS
	Sex	1	9.80	0.7965	NS
	Interaction	1	2.59	0.2101	NS
	Error	52	12.31		
5	Condition	1	6.85	0.7512	NS
	Sex	1	6.17	0.6774	NS
	Interaction	1	49.41	5.4212	< .05
	Error	46	9.12		
6	Condition	1	1.11	0.0582	NS
	Sex	1	82.09	4.2983	< .05
	Interaction	1	2.86	0.1500	NS
	Error	44	19.10		

differences due to experimental conditions significant at the .05 level of confidence or better. A sex difference in favor of girls is found in the sixth grade and a significant interaction is found in the fifth grade, with girls profiting disproportionately from the unevaluated conditions.

The means and standard deviations of the closure scores of the Incomplete Figures Test are contained in Table 14.13. In eleven of the

Table 14.13

Means and Standard Deviations of Closure Scores on Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

		Number		Boys		Girls	
Grade	Condition	Boys	Girls	Means	St. Dev.	Means	St. Dev.
1	A	13	14	19.31	6.77	20.07	4.48
	B	14	15	10.79	3.53	12.80	3.95
2	A	14	15	23.57	14.78	17.53	6.90
	B	13	16	9.54	5.97	10.88	4.65
3	A	12	9	14.92	3.87	11.00	2.92
	B	15	16	9.13	4.03	9.81	2.93
4	A	7	11	16.57	2.44	16.64	6.36
	B	11	8	15.06	2.32	14.77	3.29
5	A	12	19	4.92	2.78	16.79	3.08
	B	11	8	16.55	4.76	14.25	4.43
6	A	16	19	22.19	5.46	22.89	3.74
	B	6	7	15.00	4.15	22.00	2.52

twelve differences, it will be observed that subjects working under unevaluated conditions are able to delay closure better than those working under evaluated conditions. It will also be observed that there is a rather general tendency for the unevaluated conditions to produce greater variability than the evaluated conditions.

As the analysis of variance data presented in Table 14.14 indicate, the differences in favor of the unevaluated condition are significant at the .01 level of confidence or better in the first, second, third, and sixth grades. There are no significant differences due to sex but interaction is significant in the third and sixth grades, with boys profiting most by the unevaluated condition in both cases.

Table 14.14

Analysis of Variance Data to Test Significance of Difference in Mean Closure Scores of Incomplete Figures Test by Sex and Grade Under Unevaluated (A) and Evaluated (B) Conditions

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-ratio	Level of Significance
1	Condition	1	866.96	37.8060	<.01
	Sex	1	27.85	1.2146	NS
	Interaction	1	5.46	0.2381	NS
	Error	52	22.93		
2	Condition	1	1474.67	18.7099	<.01
	Sex	1	80.85	1.0258	NS
	Interaction	1	195.97	2.4864	NS
	Error	54	78.82		
3	Condition	1	165.83	13.5124	<.01
	Sex	1	17.20	1.4011	NS
	Interaction	1	65.27	5.3182	<.05
	Error	48	12.27		
4	Condition	1	36.19	2.5122	NS
	Sex	1	0.43	0.0297	NS
	Interaction	1	0.37	0.0256	NS
	Error	52	14.41		
5	Condition	1	2.15	0.1597	NS
	Sex	1	0.82	0.0611	NS
	Interaction	1	49.38	3.6617	NS
	Error	46	13.48		
6	Condition	1	136.27	7.2747	<.01
	Sex	1	69.40	3.7050	NS
	Interaction	1	93.25	4.9780	<.05
	Error	44	18.73		

Discussion

The central hypothesis examined in the classroom experiments described in this chapter is that individuals having experienced a period of unevaluated practice coupled with encouragement for free experimentation will produce ideas which will be judged as having a higher degree of various creative qualities than individuals having experienced a period of constructive, positive evaluation. In executing the experiment, a careful attempt was made to conduct both the unevaluated and the evaluated practice sessions in as intelligent and as expert a manner as possible. Thus, there was some direction in the unevaluated sessions and a great deal of freedom and permissiveness in the evaluated session. In some ways, this probably weakened the experimental treatments by making them less distinct from one another as they might have been. We believed, however, that this was the reasonable and fair test that we wanted to make.

Although far from conclusive the results obtained from these experiments are generally consistent with the hypothesis. Fifty-three of the eighty-four differences are in favor of the unevaluated condition. It is fairly clear that the third and fourth grade subjects under unevaluated conditions perform significantly better than similar subjects under evaluated practice. The differences in means for these grades are rather consistently in favor of the unevaluated condition but do not always reach statistical significance. The results pertaining to the first and second grades also lend some support to the hypothesis.

The results for the fifth and sixth grades are more complicated than those for the first four grades. Most of the differences are very small and non-significant but a few of them are statistically significant in the opposite direction. In general, it is perhaps fair to say that children in the first four grades tend to respond more favorably to unevaluated than to evaluated practice but that this is not true of children in the fifth and sixth grades. They appear to be either relatively unaffected by the differences in practice conditions or to respond better to the evaluated practice condition. Apparently their school experiences have made them more dependent upon external evaluation than are the younger children. It would probably require a number of experiences under unevaluated conditions before children at this age would be able to respond to the freedom of this condition by an increase in the level of their creative behavior.

Summary and Conclusions

Discussions of the teacher's evaluative practices and issues concerning external evaluation in general led us to formulate the hypothesis that individuals working under unevaluated practice and with encouragement to experiment freely would produce better creative work on subsequent occasions than individuals working under conditions of evaluated practice.

To test this hypothesis a classroom experiment was conducted in grades one through six in a public elementary school. The results indicate that younger children (grades one through four) are apparently affected more strongly by adult evaluation than are the older children (grades five and six). For the former an unevaluated period free from the fear of making mistakes seems to be somewhat more conducive of creative work in general than for older children. It seems quite likely that younger children behave more creatively under unevaluated practice conditions than under the best constructive evaluation conditions.

There are indications, however, that evaluation differentially affects some of the dimensions thought to be important in creative work. Additional experiments will be required to clarify the conditions under which different kinds of creative thinking (originality, elaboration, etc.) flourish. These studies should also consider possible differential effects due to task differences.

Chapter 15[1]

CRITICAL AND CREATIVE PEER EVALUATED PRACTICE

In Chapter 14, we were concerned about the influence of the teacher or the adult leader as a source of external evaluation upon the creative behavior of children. In this chapter, we shall be concerned about the peer group as a source of external evaluation. Some teachers make rather extensive use of peer evaluation in the classroom, maintaining that such a practice develops critical thinking and contributes to the development of the judgmental abilities. Some teachers also justify the use of peer evaluation because it is more powerful than teacher evaluation in bringing about proper (conforming) behavior. In the study described in this chapter we shall be interested in finding out how two different types of peer evaluation influence the creative behavior of children from kindergarten through sixth grade. We shall be especially concerned about originality and elaboration.

Two rather similar incidents with quite different evaluations by two rather keen observers of classroom behavior will serve to highlight the purpose of the study described herein. In the first incident, Natalie Robinson Cole places a positive evaluation upon the use of peer judgment concerning creative behavior:

> Suppose we let the children decide how things are going.
>
> "I'm through! I'm through!" says Ernesto.
>
> "Children, Ernesto says he's through. What do you think?"
>
> "No. He hasn't enough things happening."
>
> "He has to weave more people in."
>
> "It's too dishwatery. He needs stronger color."
>
> "It's too fussy. He worries too much."
>
> "It's too dead. He paints too slow."
>
> "I think it's pretty good. He just came here a while back."
>
> "I think like Lucille," says the teacher. "It's pretty good. Of course, he is a bit too careful. But then we all were when we first started. Maybe he could put the man grinding carrots and the boys washing trays. And what a splendid place he has for the cash register." (Cole, 1940, p.14)

In the second incident Jules Henry places a negative evaluation upon a somewhat similar episode:

> Carping criticism, painfully evident in almost any American classroom, is viciously destructive of the early tillage of those creative impulses we say we cherish.
>
> Listen to a fifth-grade class: The children are taking turns reading stories they have made up. Charlie's is called The Unknown Guest.

---

[1] Dr. Dietmar P. Schenitzki prepared most of the basic analyses of data for this chapter.

> "One dark, dreary night, on a hill a house stood. This house was forbidden territory for Bill and Joe, but they were going in anyway. The door creaked, squealed, slammed. A voice warned them to go home. They went upstairs. A stair cracked. They entered a room. A voice said that they might as well stay and find out now; and their father came out. He laughed and they laughed, but they never forgot their adventure together."
>
> TEACHER: Are there any words that give you the mood of the story?
>
> LUCY: He could have made the sentences a little better...
>
> TEACHER: Let's come back to Lucy's comment. What about the sentences?
>
> GERT: They were too short. (Charlie and Jeanne have a discussion about the position of the word "stood" in the first sentence.)
>
> TEACHER: Wait a minute; some people are forgetting their manners...
>
> JEFF: About the room: the boys went up the stairs and one "cracked," when they were in the room. Did they fall through the stairs, or what? The teacher suggests Charlie make that a little clearer...
>
> TEACHER: We still haven't decided about the short sentences. Perhaps they make the story more spooky and mysterious.
>
> GWYNNE: I wish he had read with more expression instead of all at one time.
>
> RACHEL: Not enough expression.
>
> TEACHER: Charlie, they want a little more expression from you. I guess we've given you enough suggestions for one time. (Charlie does not raise his head, which is bent over his desk as if studying a paper.) Charlie! I guess we've given you enough suggestions for one time, Charlie, haven't we?" (Henry, 1963, p. 88)

Friedenberg (1959) and other observers of the classroom process, especially in the adolescent years, report that peer evaluation gets out of control and teachers find themselves practically helpless even to acknowledge something truly excellent about the creative production of a pupil.

From our knowledge of developmental psychology, we know that we can expect a great deal of disparaging peer evaluation among children during what Harry Stack Sullivan (1953) calls the Juvenile Era (usually occurring during the primary school years). During this period children learn the techniques and strategies of ostracizing group members, segregating into groups, stereotyping, and dispargement. We know that children may find life during this period very stressful if there develops in their peer group an atmosphere of overcompetition and if the stereotyping, ostracizing, and disparaging are severe. Since disparagement is presumed to have developmental aspects, we shall be interested in the present investigation to notice grade-level differences in reactions to the two different kinds of peer evaluation studied.

Procedures

This field experiment was conducted in a public, metropolitan elementary school and involved the total enrollment of the school from kindergarten through sixth grade. The experiment and its objectives were discussed with the entire faculty of the school one week in advance of the actual conduct of the study. The Principal Investigator served as the experimenter in all cases and an assistant recorded almost verbatim the verbal interaction between him and the children. In each classroom, the experimenter explained the purpose and procedures of the experiment to the subjects. An attempt was made to heighten interest and motivation. As in the experiment reported in the previous chapter, prizes were offered for outstanding performances in the test task. The experimenter attempted to make it clear that the practice performance did not count towards winning the prize but was to permit experimentation with different ideas.

Subjects were told that the Investigator wanted their help in learning how pupils think of original, i.e., unusual and interesting, ideas. Originality and elaboration were emphasized in the instructions. Following the motivation instructions, the experimental procedure was outlined briefly. Following this brief orientation, materials for the first practice task were distributed.

Tasks and Instructions

The two tasks used in the study described in Chapter 14 were used in the present study (Picture Construction and Incomplete Figures).

Under Condition A (Critical Peer Evaluation), subjects were encouraged at the end of each practice session to evaluate critically one another's productions. They were asked specifically to point out things which could be corrected, "things that were wrong with it," and the like. (Children in the kindergarten and early primary grades, however, were rather reluctant to criticize the work of their peers.)

Under Condition B (Creative Peer Evaluation), subjects were encouraged at the end of each practice session to suggest other possibilities for making the pictures more unusual and interesting, possible additions which would have made the pictures tell a more complete or elaborate story, etc.

In other words, Condition A emphasized deficiencies and Condition B stressed other possibilities.

Scoring of the productions was the same as those already described for the Picture Construction and Incomplete Figures Tests. Since the actual practice session in this experiment was not itself affected by the differences in experimental manipulations, we were able to work with difference or change scores, whereas this was not possible in the study described in Chapter 14. Alternative procedures were considered (Harris, 1963)) but the use of difference scores seemed appropriate for the purposes of this study.

Results

Picture Construction or Shape Test

The means and standard deviations of the total difference scores on the Picture Construction Test are shown in Table 15.1 for kindergarten through sixth grade. It will be noted that under Condition A (Critical Evaluation), the mean change scores rise from kindergarten through the third grade but the fourth grade mean drops below the level of the second grade mean. Under Condition B (Creative Evaluation), however, a peak is reached in the fourth grade followed by only slight drops in the fifth and sixth grades. It will also be noted that the differences are relatively small and in favor of the Critical Evaluation Condition in the kindergarten through third grade. The reverse is true in the fourth, fifth, and sixth grades and the observed differences are more impressive than in the lower grades.

Table 15.1

Means and Standard Deviations of the Total Creativity Difference Scores (Post-Test Scores -- Pre-Test Scores) on the Picture Construction or Shape Task under Critically (A) and Creatively (B) Evaluated Practice Conditions

Grades and Conditions		Number	Mean Gain Scores	Standard Deviation
K	A	53	9.17	7.35
	B	62	8.77	7.03
1	A	43	13.44	7.17
	B	19	12.58	5.68
2	A	26	16.38	5.92
	B	56	16.30	4.91
3	A	32	16.91	6.34
	B	28	15.43	7.00
4	A	38	14.32	6.08
	B	16	19.12	6.10
5	A	34	14.35	6.27
	B	27	18.22	6.28
6	A	30	16.67	5.61
	B	21	18.43	4.16

The analysis of variance data for testing the significance of the differences observed in Table 15.1 are presented in Table 15.2. It will be noted that the differences in the kindergarten, first, second and third grades are not statistically significant. The differences in both the fourth and fifth grades are statistically significant but the difference in the sixth grade falls short of statistical significance.

Table 15.2

Analysis of Variance Data to Test Significance of the Effects of Critically (A) and Creatively (B) Evaluated Practice Conditions on the Total Creativity Difference Score (Post-Pre-Test Scores) on the Picture Construction or Shape Task for Grades Kindergarten through Sixth.

Grade	Source of Variance	Degrees Freedom	Mean Squares	F-ratio	Level of Significance
K	Between	1	4.4722	0.0867	NS
	Within	103	51.9425		
1	Between	1	9.8121	0.2150	NS
	Within	60	45.6204		
2	Between	1	.1166	0.0042	NS
	Within	80	27.5499		
3	Between	1	32.6074	0.7360	NS
	Within	58	44.3021		
4	Between	1	260.4098	7.0382	< .05
	Within	52	36.9978		
5	Between	1	225.3063	5.7237	<.025
	Within	59	39.3628		
6	Between	1	38.3473	1.2996	NS
	Within	49	29.5061		

The mean difference or change scores for elaboration and originality, on the Picture Construction Test are contained in Table 15.3. In

Table 15.3

Mean Difference Scores for Elaboration (or Complexity) and Originality, on the Picture Construction Task under Critically (A) and Creatively (B) Evaluated Practice Conditions for Grades Kindergarten through Sixth

Grade and Conditions		Number	Elaboration		Originality	
			Mean	St. Dev.	Mean	St. Dev.
K	A	53	2.85	2.21	2.40	2.97
	B	62	2.87	2.37	1.73	2.57
1	A	43	3.28	2.30	3.16	2.79
	B	19	4.21	1.70	1.95	2.09
2	A	26	4.15	1.55	4.85	3.18
	B	56	4.38	1.82	3.80	3.23

Table 15.3: cont.

Grades and Conditions		Number	Elaboration		Originality	
			Mean	St. Dev.	Mean	St. Dev.
3	A	32	4.94	1.95	4.91	3.06
	B	28	4.71	2.94	4.07	3.30
4	A	38	4.08	1.78	3.95	2.84
	B	16	4.19	1.72	5.31	3.77
5	A	34	4.32	2.29	4.47	3.49
	B	27	5.22	2.61	3.56	2.73
6	A	30	5.80	2.20	3.30	3.13
	B	21	4.95	2.29	3.76	2.98

general the trends noted for total scores hold also for elaboration and originality. There is a drop under both conditions in elaboration in the fourth grade.

Table 15.4 contains the analysis of variance data for testing the significance of the differences in means observed in Table 15.3. Although four of the differences in elaboration tend to favor the Creative Evaluation Condition, none of them are significant at the .05 level or better. The differences in originality due to experimental conditions are significant at the .10 level of confidence in the second and fourth grades.

The mean change scores for the dimensions of sensitivity and communication on the Picture Construction Test are presented in Table 15.5.

Table 15.5

Mean Difference Scores for Dimensions of Sensitivity and Communication on the Picture Construction Test under Critically (A) and Creatively (B) Evaluated Practice Conditions for Grades Kindergarten through Sixth

Grades and Conditions		Number	Sensitivity		Communication	
			Mean	St. Dev.	Mean	St. Dev.
K	A	53	1.49	1.80	1.40	2.50
	B	62	1.58	2.08	1.65	1.98
1	A	43	2.00	1.59	3.37	2.04
	B	19	2.11	1.41	2.00	2.21
2	A	26	2.15	1.24	3.50	1.38
	B	56	2.18	1.73	4.11	1.88
3	A	32	2.69	1.52	2.75	1.57
	B	28	2.57	1.95	2.39	1.93
4	A	38	2.29	1.90	2.87	1.75
	B	16	3.81	2.37	4.94	2.20
5	A	34	2.15	1.40	2.76	2.17
	B	27	3.30	2.16	4.67	1.92
6	A	30	1.97	1.63	3.07	1.67
	B	21	3.24	1.81	5.14	2.33

Table 15.4

Analysis of Variance Data to Test Significance of the Effects of Critically (A) and Creatively (B) Evaluated Practice Conditions on the Mean Elaboration and Mean Originality Difference Scores on the Picture Construction for Grades Kindergarten through Sixth

Grades	Source Variance	Degrees Freedom	Mean Elaboration Difference Scores			Mean Originality Difference Scores		
			Mean Squares	F-Ratio	Level of Significance	Mean Squares	F-Ratio	Level of Significance
K	Between	1	.0173	0.0025	NS	12.8428	1.6094	NS
	Within	113	597.7603			861.0181		
1	Between	1	12.6031	2.6642	~.10	21.7652	3.2926	<.10
	Within	60	4.7305			6.6103		
2	Between	1	.8684	0.2864	NS	19.3004	1.8733	NS
	Within	80	3.0313			10.3028		
3	Between	1	.7441	0.1227	NS	10.4074	1.0327	NS
	Within	58	6.0618			10.0788		
4	Between	1	.2926	0.0937	NS	35.8715	3.8158	<.10
	Within	52	3.1232			9.4006		
5	Between	1	12.1544	2.0482	NS	12.6005	1.2926	NS
	Within	59	5.9340			9.7480		
6	Between	1	8.8751	1.7696	NS	2.6355	0.2927	NS
	Within	49	5.0153			9.0022		

The differences in sensitivity are rather consistently in favor of the creatively evaluated condition, whereas communication scores show the same general tendency as the total scores.

The data for testing the significance of the differences observed in Table 15.5 are presented in Table 15.6. On sensitivity, the differences are statistically significant only in the upper grades (fourth, fifth, and sixth grades). All are in favor of the creatively evaluated condition. High levels of significance are also noted in the same direction for the communication dimension in these same grades. It will also be noted that the difference in the first grade is significant at the .05 level on communication but the difference is in favor of the critically evaluated condition.

Incomplete Figures Test

The means and standard deviations of the total improvement scores on the Incomplete Figures Test are shown in Table 15.7. It will be noted

Table 15.7
Mean and Standard Deviations of Total Creativity Difference Scores on the Incomplete Figures Test under Critically (A) and Creatively (B) Evaluated Practice Conditions

Grades and Conditions		Number	Mean Gain Scores	Standard Deviation
K	A	20	.95	7.69
	B	57	5.63	10.78
1	A	41	6.17	11.48
	B	20	15.00	9.03
2	A	25	.80	11.41
	B	59	8.94	12.89
3	A	31	8.92	12.60
	B	31	5.58	12.62
4	A	40	12.85	13.00
	B	16	10.19	13.69
5	A	33	6.73	13.81
	B	27	14.56	16.17
6	A	31	13.61	9.79
	B	21	19.52	16.78

that the differences are in favor of the creatively evaluated condition in the kindergarten, first, second, fifth, and sixth grades.

The analysis of variance data for testing the significance of these observed differences are reported in Table 15.8. It will be noted that

Table 15.6

Analysis of Variance Data to Test Significance of the Effects of Critically (A) and Creatively (B) Evaluated Practice Conditions on the Mean Sensitivity and Mean Communication Difference Scores on the Picture Construction Test for Grades Kindergarten through Sixth

			Mean Sensitivity Difference Scores			Mean Communication Difference Scores		
Grades	Source Variance	Degrees Freedom	Mean Squares	F-Ratio	Level of Significance	Mean Squares	F-Ratio	Level of Significance
K	Between	1	.2319	0.0603	NS	1.7706	0.1859	NS
	Within	113	434.3421			564.8729		
1	Between	1	.1460	0.0600	NS	24.8083	5.2220	< .05
	Within	60	2.4298			4.7507		
2	Between	1	.0108	0.0060	NS	6.5453	1.9476	< .25
	Within	80	1.7949			3.3607		
3	Between	1	.2012	0.0712	NS	1.9084	0.6253	NS
	Within	58	2.8229			3.0461		
4	Between	1	26.1171	6.2226	< .025	48.2018	13.4555	< .001
	Within	58	4.1971			3.5823		
5	Between	1	19.8760	6.3770	< .025	54.4397	22.6012	< .001
	Within	59	3.1168			2.4087		
6	Between	1	19.9687	6.6664	< .025	53.2481	12.5177	< .001
	Within	49	2.9954			4.2538		

Table 15.8

Analysis of Variance Data to Test Significance of the Effects of Critically (A) and Creativity (B) Evaluated Practice Conditioning on the Total Creatively Difference Scores on the Incomplete Figures Test for Grades kindergarten through sixth

Grade	Source of Variance	Degrees of Freedom	Mean Squares	F-Ratio	Level of Significance
K	Between	1	324.4881	3.1811	<.10
	Within	75	102.00		
1	Between	1	1047.9326	9.0579	<.01
	Within	59	115.69		
2	Between	1	1052.5940	6.7618	<.025
	Within	82	155.67		
3	Between	1	133.5644	0.8397	NS
	Within	60	159.05		
4	Between	1	81.0161	0.4650	NS
	Within	54	174.21		
5	Between	1	910.0377	4.0925	<.05
	Within	58	222.36		
6	Between	1	437.4070	2.5703	≃.10
	Within	50	170.17		

all four of the differences in favor of the creatively evaluated condition are statistically significant or approach significance, whereas neither of the other two differences even approach statistical significance.

The mean difference scores for originality, elaboration and closure on the Incomplete Figures Test are shown in Table 15.9. This is

Table 15.9

Mean Difference Scores (Post- Pre-Test Mean Scores) for Originality, Closure and Elaboration on the Incomplete Figures Test under Critically (A) and Creatively (B) Evaluated Practice Conditions for Grades Kindergarten through Sixth

Grades and Conditions		Number	Originality		Elaboration		Closure	
			Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
K	A	20	-.95	3.32	-.45	2.25	2.50	5.03
	B	57	1.09	3.83	.26	2.36	4.00	7.84
1	A	41	2.05	4.65	.85	4.27	5.32	6.07
	B	20	4.15	4.06	1.05	3.75	9.45	6.35
2	A	25	.44	5.10	-1.40	5.63	1.60	4.56
	B	59	.85	4.40	3.37	5.78	4.15	6.16
3	A	31	2.74	5.44	1.65	4.92	4.03	5.62
	B	31	.65	4.69	2.77	5.96	2.06	5.81
4	A	40	3.82	6.04	3.32	6.03	5.20	5.95
	B	16	3.06	6.21	2.56	5.06	3.94	6.04

Table 15.9: cont.

Grades and Conditions		Number	Originality		Elaboration		Closure	
			Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev
5	A	33	1.24	4.96	1.42	5.49	3.61	7.46
	B	27	3.22	5.67	4.22	5.77	5.67	7.08
6	A	31	1.61	5.03	5.29	4.12	6.39	4.83
	B	21	4.48	4.74	4.95	6.52	9.00	7.32

essentially a repetition of the pattern observed for total scores. The differences favor the creatively evaluated condition except in the third and fourth grades.

Table 15.10 contains the analysis of variance data for testing the significance of the differences observed in Table 15.9. The differences in originality scores in favor of the creatively evaluated condition are statistically significant in the kindergarten, first grade, and sixth grade, and approach significance in the fifth grade. On elaboration, the differences in favor of the creatively evaluated condition are statistically significant in the second and fifth grades. On closure, we find statistically significant differences only in the first and second grades, although the difference in the sixth grade approaches statistical significance. All three of these differences are in favor of the creatively evaluated condition.

Summary

Nineteen of the 32 differences examined in the kindergarten through third grade are in favor of the creative evaluation condition. Ten of these differences are statistically significant at the .10 level or better but only one of the reversals is statistically significant at this level. In the fourth, fifth, and sixth grades, 19 of the 24 differences studied are in favor of the creatively evaluated condition. Thirteen of these differences are statistically significant at the .10 level or better and none of the reversals is statistically significant. Thus, although the results are not highly conclusive, the weight of the evidence definitely leans on the side of the creative rather than critical peer evaluated condition. The evidence in the fourth, fifth, and sixth grades is especially strong.

Discussion

In the introductory section we pointed out that teachers often employ peer evaluation with the expectation that this technique might successfully facilitate the learning process. The hypothesis was proposed that creative peer evaluation is more conducive of creative thinking than critical peer evaluation. This expectation is at least partially confirmed by our data.

Table 15.10

Analysis of Variance Data to Test Significance of the Effects of Critically (A) and Creatively (B) Evaluated Practice Conditions on the Mean Difference Scores for Originality, Elaboration, and Closure on the Incomplete Figures Task for Grades Kindergarten through Sixth

			Mean Originality Diff. Scores			Mean Elaboration Diff. Scores			Mean Closure Diff. Scores		
Grades	Source Variance	Degrees Freedom	Mean Squares	F-Ratio	Level Signif.	Mean Squares	F-Ratio	Level Signif.	Mean Squares	F-Ratio	Level Signif.
K	Between	1	61.4755	4.4698	<.05	7.5298	1.3807	<.25	33.3117	.6373	NS
	Within	75	13.7535			5.4534			52.2667		
1	Between	1	59.3508	2.9764	<.10	0.5182	0.0306	NS	229.6146	6.0483	<.025
	Within	59	19.9399			16.9165			37.9632		
2	Between	1	2.9152	0.1367	NS	400.0129	12.1494	<.001	114.4086	3.4763	<.10
	Within	82	21.3145			32.9233			32.9101		
3	Between	1	68.1452	2.6395	<.25	19.7577	0.6613	NS	60.0161	1.8364	>.25
	Within	60	25.8172			29.8753			32.6806		
4	Between	1	6.6446	0.1792	NS	6.6447	0.1990	NS	18.2160	0.5103	NS
	Within	54	37.0687			33.3836			35.6914		
5	Between	1	58.2060	2.0778	<.25	116.2560	3.6791	<.10	63.0546	1.1858	NS
	Within	58	28.0125			31.5987			53.1703		
6	Between	1	102.6378	4.1770	<.05	1.4298	0.0525	NS	85.4721	2.4098	>.25
	Within	50	24.5719			27.1868			35.4671		

Considering the trends for the total scores first, we find significant differences between the conditions in favor of the creative peer evaluation treatment for the upper three grades on the first task, the Picture Construction Test. The data for the lower four grades, however, do not support the hypothesis. There are in fact no statistically significant differences between the conditions. The failure to obtain differential effects in the kindergarten and primary grades may be due to several factors. First, it is possible that the experimental manipulations were not effective. There are some incidental observations to the effect that the pupils in these grades were rather reluctant to evaluate critically their peers' productions. Second, it is possible that critical peer evaluation in the lower grades is as effective as creative peer evaluation; or third, that it actually makes no difference what their peers think of their productions. However, we find differential effects in the predicted direction in the upper two as well as in the lower three grades on the Incomplete Figures Task. These results suggest that task differences are probably at least partially responsible for the differential effects of the treatment. Or, it might be that the cumulative effects of peer criticism may become inhibiting, whereas the initial critical session did not have this effect.

Two of the dimensions, namely complexity (or elaboration) and originality are common to both the Incomplete Figures Task and the Picture Construction Task. The data on complexity or elaboration indicate that the creative peer evaluation condition is more effective in stimulating creative work than the critical peer evaluation condition regardless of the task. On the Picture Construction Test, the mean change scores for elaboration are higher in the creative peer evaluation condition than in the critical peer evaluation condition in Kindergarten and in the lower three grades and in the fourth and fifth grades. The data on the Incomplete Figures Test are in favor of the creative peer evaluation in the lower four grades and in the fifth grade.

The data on originality, however, suggest that the effectiveness of the treatments depends on the nature of the task. On the Picture Construction Test, only two differences concerning originality occur in favor of the creative peer evaluation (fourth and fifth grade). On the Incomplete Figures Test, all but two originality net means (those in the third and fourth grade) are in favor of the creative peer evaluation condition. This may mean that the treatments affect originality differently depending on the nature of the task; or that the originality dimension in the Picture Construction Test is different from the originality dimension in the Incomplete Figures Test. However, in both cases the assessment of originality is based on infrequency of response. Therefore, it seems unlikely that the differences between the tasks on originality are attributable to differences in methods of assessment.

The other dimensions of the two tasks are unique to each task. On sensitivity, on the Picture Construction Test, the upper grades show higher creativity scores in the creative evaluation condition than in the critical peer evaluation condition. The same results are obtained on the scores of the Picture Construction Test on communication. There occur no differential effects (with the exception in the first grade) in the lower grades on communication. In regard to the Incomplete Figures Test, there is less of a tendency to close the figures in a simple way under the creative peer evaluation than under the critical peer evaluation, in the lower three and upper two grades.

Across the tasks and irrespective of the different dimensions we consistently find that the students in the third grades tend to do better creative work under the critical peer evaluation than under the creative peer evaluation. This is also true for the fourth grades on the Incomplete Figures Task. However, these differences are statistically not significant.

Summary

The field experiment reported herein was undertaken to examine the effect of critical and creative peer evaluation upon creative work and thinking. We hypothesized that creative peer evaluation is more conducive to creative thinking than critical peer evaluation. This hypothesis is based on the assumption that critical evaluation of any type is less promotive of creative work than positive or no evaluation. This assumption is made by a number of researchers and has also some empirical support.

To test this hypothesis, a field experiment was carried out in one of the public elementary schools in Minneapolis, Minnesota. The classes at each grade level were assigned randomly to the experimental conditions of creative and critical peer evaluation. The two tasks used were (a) a picture construction task and (b) an incomplete figures task. First, the students worked for five minutes on the first part of the task. Before they were administered the test task, the experimenter manipulated the evaluation variable.

The results on the Picture Construction Task indicate that the students in the upper grades do better creative work under the creative peer evaluation than under critical peer evaluation. To the younger children, differences in the type of evaluation appear to make no differences. The results on the Incomplete Figures Test show, however, that younger as well as older children do better creative thinking under the creative peer evaluation than under critical peer evaluation. Factors likely to be responsible for these differences were discussed. It is suggested that controlled studies are required that systematically attempt to disentangle factors related to task differences, the nature and intensity of the evaluation, and the cumulative effects of the treatments.

Chapter 16[1]

TALKING WITH CHILDREN ABOUT THEIR CREATIVE PRODUCTIONS

In Chapters 14 and 15, we have been concerned about the evaluative behavior of the teacher or adult leader when all members of the classroom group are subjected to essentially the same evaluative approach. Even a very cursory examination of the data obtained in the experiments described in Chapters 14 and 15 indicate that some children responded positively while others responded negatively to each of the different evaluative conditions created. Again, this observation reminds us of the importance of individualizing instruction. An important aspect of individualization of instruction relative to creative work is the way in which teachers talk with individual pupils about their productions. The study described in this chapter represents an attempt to find out how teachers and student teachers talk with children about their creative writing, or at least how they say or think they should talk with pupils about their creative work.

Problems in Correcting Creative Writing

There has been much discussion among experts and some research devoted to the problem of correcting or evaluating the creative writings of children. A few of these opinions and research results will be reviewed in order to clarify the issues involved in the present exploratory investigation.

Marjorie L. Hourd and Gertrude E. Cooper (1959), two British authorities on creative writing among children, lament that in correcting written compositions "teachers are often too bent on assessment to hear what a child is trying to convey on deeper levels simultaneously with the manifest drift of the narrative." They believe that teachers rarely have the time to grasp the fulness of children's creative writings and describe some of their own experiences in savoring the heroic spirit of children as manifested in their original writings.

Sylvia Ashton-Warner (1963), a New Zealand teacher, takes an even stronger stand against correcting the writings of children. She writes: "You never want to say that it's good or bad...You've got no right at all to criticize the content of another's mind.

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[1] I was assisted in the preparation of this chapter by R. E. Myers.

A child doesn't make his own mind. It's just there...I never mark their books in any way; never cross out anything beyond helping them to rub out a mistake, never put a tick or stamp on it and never complain of bad writing..."

Most American experts on creative writing recognize the complexity of the problem of evaluating the productions of children. Almost none of them are willing to abandon the correction of children's writings to the extent advocated by Ashton-Warner. In general, they maintain, that a child writing for others must write his thoughts correctly. Some, like Mabel C. Smith (1943), place their emphasis on the prevention and elimination of errors. They maintain that this can be accomplished by orderliness, intensive planning, the development of good work habits, emphasis on accuracy, and the like. Smith, among others, recommends that errors in writing be prevented by postponing writing until children are older, requiring children to write very little, or having children dictate their stories. All of these efforts are to avoid the dangers of practicing errors.

Guided, Self-Evaluation and Self-Correction

Some American writers, like Marshall (1960), believe that the greatest personal growth and development in creative writing results from learning to evaluate one's own work. Marshall has described how she used this approach with seventh graders. Her pupils kept their weekly themes filed in chronological order. Each theme was graded and commented upon by the teacher. Themes were sometimes read aloud in class and criticized by the group. Later they were asked to bok over the themes they had written list their grades, reread the comments and decide upon a mark which would fairly express what they had done. Marshall reported that themes showed continuous improvement throughout the year.

A number of American writers recommend that children be instructed to concentrate first upon the expression of their ideas without concern about correctness and then to work over what they have written several times until it is polished. Others oppose even this momentary respite from concern about correctness because it involves practicing errors. Many insist that all errors be corrected in written work, while others argue that the correction of all errors in creative writing leaves the teacher with no time to do anything else and tends to bewilder rather than help the child. They maintain that when children find some strong purpose for writing correctly and neatly that they will be motivated to do so. Illustrative of this point of view is the following example described by Dinkmeyer and Dreikurs (1963, p. 65).

"Tim does well in creative work but is apt to be in such a hurry that his writing is messy. For an American history assignment, he wrote a poem about Captain John Smith which was so good that each of the other fifth-grade classes wanted a copy. Thrilled by this recognition, Tim made three very neat copies for them." Dinkmeyer and Driekurs make the point that correctness and neatness took on new significance when there was a real purpose for its being readable. They point out that the teacher focused on an asset, the creative work, and used the opportunity to let the child recognize for himself the value of neat work.

The Theme-a-Week Practice

The research related to the effects of requiring a theme a week and/or correcting creative writing has been rather consistent. Unfortunately much of this research has not been reported. Both the published and unpublished studies indicate that the theme-a-week requirement tends to defeat its purpose of promoting either correct writing or creative writing. Two studies reported by Heys (1962) are apparently rather typical. The first of these studies involved only two eleventh-grade classes. One of them wrote the equivalent of a theme a week and the second was excused from practically all composition work for the entire year. Instead, this latter class did a greater amount of reading both inside and outside class. The results at the end of the year showed that both groups had improved in their ability to write, that both groups had improved about the same amount and the slight differences obtained were in favor of the group that had done little or no writing.

Eight classes, two in each grade and taught by the same teacher, participated in the second study. One class at each grade level was designated as the "writing class" and the other as the "reading class." The writing class wrote the equivalent of a theme a week and the reading class wrote a theme every third week and spent the rest of the time reading. In all other respects both groups followed the curriculum appropriate for their grade. The evaluation involved the administration of the STEP Writing Test, Form 2A in the fall and the STEP Writing Test, Form 2B in the spring. All students wrote two test compositions, one in the fall and the other in the spring. These were read and evaluated by three experienced readers of the College Board's English Achievement Test. Except for some seniors (but not all) and except for some low groups (but not all) and except for the area of content and organization (but not always) Heys obtained consistently better results from students in the reading classes than those in the writing classes. He concluded that "the way to learn to write is to write" is not substantiated by the experiment, and neither is the claim that ability to write well is related to the amount of writing done. He also concluded that for many students reading is a positive influence on writing ability.

A Study of Three Methods of Evaluation

An experiment reported by Darnell (1962) involving three different methods of evaluating writings upon creativity also indicates that no advantages result from emphases upon correcting errors. Darnell's methods of evaluation were labeled "accepting," "critical," and "stoical." In the accepting approach, creative productions were acceptable as they were. Children were encouraged to share their written products by reading them to their classmates and teacher. The products were neither graded nor corrected, but were placed into individual folders for each child. In the critical approach, the written products were not acceptable as they were turned in unless they were perfect. Products were graded and corrected and then returned to pupils for proofreading and recopying. The papers were then collected again and placed in individual folders. Under the stoical approach, no value was placed on the products. Responses were simply collected and placed into individual folders. The experiment lasted for ten weeks.

The method of product evaluation did not influence the quality of the creative expression. A number of qualities of writing, however, were influenced at certain grade levels (fourth, fifth, and sixth grades). The accepting approach produced more total products than either of the other two methods, fewer errors in spelling for the fifth grades than under the other two methods of evaluating products, and fewer punctuation errors for fourth, fifth, and sixth grades at the ninth week than at the first or fifth week. The critical approach produced more different types of writing than the accepting approach and more spelling errors than the accepting approach. The stoical approach produced more total products than the critical approach, and fewer spelling errors for the fourth grades than the accepting approach.

Procedure

Subjects

Data were obtained from three groups of subjects. The first group included 128 students enrolled in undergraduate courses at the University of Minnesota. The classes dealt with instruction in the language arts in the elementary school. Ninety-five had had no teaching experience and the remaining 33 had either had some teaching experience or were at the time of the study engaged in their student teaching experience. The second group consisted of 34 experienced teachers not enrolled at the University. They were volunteers who had participated in language arts workshops or institutes conducted by the author in response to the announcement of a contest to determine who could devise the best strategy for dealing with the problem of talking with two children who had submitted the sample stories given the subjects as a basis for talking with the pupils.

The third group included 90 graduate students, most of whom are experienced teachers, enrolled in a course in personality development and mental health. All subjects were given a relatively unlimited time in which to prepare their responses.

Almost all of the subjects took the task seriously and many of them prepared very elaborate proposals for talking with the two children who had written the stories. Some subjects were extremely conscientious in relating, step-by-step, how they would attempt to help the two young authors. A few refused to try to devise a strategy, reporting their inability to cope with such "impossible cases." All of these, however, were the student teachers or undergraduates.

The Test Task

Subjects were asked to sketch the strategies they would use in talking to two elementary pupils who had written the following stories:

Story 1. This story is neatly written; each letter is formed almost perfectly; and the margin is straight.

The Cat That Does Not Scratch

If a cat would scratch me I would scratch it back. I do not like to be scratched by a cat. If a cat would scratch me, I would try to make friends with the cat. If he likes me, I will feed him.

Story 2. The following story is rather untidy; the margin is uneven; and the writing is irregular and smudged.

The Cat That Coundn't Scratch

What a cold and dark night it was! Chester my cat was awful lonsum and tird. That was the nite he went to the hot hous and saw alot of Firo Flies. He asked them if they wud make frens because he was so lonly. But do you know what happend! They thot he was a Fire Flie too. You see his eyes glowed. So they sat on him and wouldn't get off.

So the next mornin, Chester went into the house and he couldn't scrach, or else he wud have a hot foot.

Results

How Teachers Say They Would Talk With Children

In order to begin formulating a picture of the way teachers and student teachers believe they should talk with children about their creative writing, an analysis was made first of the thematic content by groups (undergraduates, teachers in service, and graduate students, experienced teachers and other educators enrolled in a course in personality development and mental health) and then according to the educational level of the teaching experience (primary grades, intermediate grades, and high school and higher). Tabulations were made for each of the plans for the two pupils for each subject of each reference to criticism (about mechanics, content, or adjustment), praise (about mechanics, content, and adjustment), creative aspects of the productions, the use of self-evaluation, a remedial or first-aid plan (relative to mechanics, content, and adjustment), and a developmental plan (relative to mechanics, content, and adjustment). The results expressed in percentages are presented in Table 16.1 for the three basic groups of subjects. It will be noted that there are the large

Table 16.1

Results of Thematic Analysis of Treatment Plans for Talking with Two Children Concerning Their Creative Writing by Undergraduates, Experienced Teachers, and Graduate Students in Education

	Undergraduates (N=95)		Teachers (N=34)		Graduate Stu. (N=90)	
Category	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
Criticism						
About Mechanics	3.2%	32.6%	5.9%	14.7%	0.0	21.1%
About Content	31.6	1.1	11.8	0.0	27.8	12.2
About Adjustment	10.5	1.1	11.8	5.9	5.6	4.4
Praise						
About Mechanics	61.0	0.0	52.9	0.0	34.4	1.1
About Content	7.4	70.5	2.9	70.6	5.6	50.0
About Adjustment	1.1	3.2	0.0	0.0	1.1	0.0
Creative Aspects	7.4	34.7	5.9	41.2	11.1	36.7
Non-evaluation	26.3	14.7	29.4	26.5	10.0	11.1
Self-evaluation	12.6	15.8	35.3	14.7	10.0	6.7
Remedial Plan						
About Mechanics	1.1	58.9	2.9	55.9	3.3	31.1
About Content	52.6	1.1	44.1	2.9	30.0	6.7
About Adjustment	15.8	1.1	29.4	20.6	52.2	52.2
Development Plan						
About Mechanics	0.0	14.7	0.0	20.6	1.1	4.4
About Content	3.2	4.2	8.8	8.8	8.9	3.3
About Adjustment	0.0	2.1	2.9	2.9	16.7	30.0

expected differences due to the nature of the creative production. Accordingly, many of the subjects would criticize the mechanics of the second story and the content of the first story. A large number would praise the mechanics of the first story and the content of the second. They would comment upon the creative aspects of the second story but not the lack of creativity or imagination of the first. A considerable number would pursue remedial plans related to mechanics with the author of the second story and design remedial action relative to content with the author of the first one.

Differences Among The Three Groups

A number of interesting differences among the three groups are observed and a number of them were tested for statistical significance by use of chi-square analysis. The differences among groups on criticism of the mechanics of the second story are significant at about the .05 level of confidence (chi-square = 5.5779). The undergraduates are the most critical and the experienced teachers not enrolled at the University are the least critical of the mechanics of the second story. In fact, the undergraduates are freest with criticism on all categories while the experienced teachers not enrolled in the University are least critical.

Praise related to the mechanics of the first story also varies significantly among the three groups (chi-square = 13.359, significant at the .01 level of confidence). Here the undergraduates are freest with praise while the educators enrolled in the mental health course are least free with praise. Praise related to the content of the second story also differs significantly among the groups (chi-square = 9.502, significant at the .01 level of confidence). The undergraduates and the experienced teachers are equally free with praise while the educators in the mental health course are less free.

Significant differences occur in relation to the use of non-evaluative approaches (chi-square = 9.8375, significant at the .01 level of confidence). The experienced teachers not enrolled at the University include some kind of non-evaluative approach in their plans while the mental health students make least use of this approach. The findings concerning the use of self-evaluative approaches show the same pattern (chi-square = 13.1115, significant at the .01 level of confidence.)

The undergraduates and the volunteer teachers are more likely than the mental health students to include remedial plans relative to the mechanics of the second story and of the content of the first story (chi-squares of 15.6388 and 9.7871 respectively, both significant at the .01 level of confidence). The mental health students far more frequently propose remedial plans relative to the adjustment of the author of the second story than the other two groups (chi-square = 64.778, significant at the .001 level of confidence). A similar finding is noted concerning the author of the first story as well.

In other words, the mental health students are more highly sensitized than the other subjects to the possibility that the impoverished content of the first story and the erratic writing and mechanics of the second story may be a function of anxieties, tensions, and accompanying problems of adjustment. Quite interestingly, the experienced volunteer teachers not enrolled in the University occupy a position midway between the other two groups in their sensitivity to the adjustment needs of the writers.

The findings relative to developmental plans parallel those for remedial plans, although fewer subjects proposed long-range developmental plans than proposed remedial or first-aid plans. The differences relevant to the mechanics of the author of the second story are significant at between the .01 and .02 level of confidence (chi-square = 8.1862). Differences relevant to the adjustment of the author of the first story are significant at the .001 level (chi-square = 20.0867) and of the author of the second story at the same level of confidence (chi-square 34.3534). Actually few of the subjects outside the mental health students made any reference to the possible need for long-range plans directed at improved emotional adjustment.

Educational Level of Teaching

The results according to the educational level at which the teachers are working are presented in Table 16.2. Again, attention will be given to testing the significance of large observed differences among the three educational levels (primary, intermediate, and high school or above).

Table 16.2

Results of Thematic Analysis of Treatment Plans for Talking with Two Children Concerning Their Creative Writing by Primary, Intermediate, and High School Teachers

Category	Primary Tchrs. (N=38)		Intermediate (N=26)		High School (N=60)	
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
Criticism						
About Mechanics	0.0%	10.5%	0.0%	19.2%	0.0%	25.0%
About Content	10.5	0.0	11.5	0.0	36.7	18.3
About Adjustment	10.5	5.3	3.8	3.8	6.7	5.0

Table 16.2 cont.

Category	Primary Tchrs. (N=38) No. 1	Primary Tchrs. (N=38) No. 2	Intermediate (N-26) No. 1	Intermediate (N-26) No. 2	High School (N=60) No. 1	High School (N=60) No. 2
Praise						
About Mechanics	47.4%	0.0%	53.8%	0.0%	30.0%	1.7%
About Content	5.3	60.5	0.0	57.7	6.7	51.6
About Adjustment	2.6	0.0	0.0	0.0	0.0	0.0
Creative Aspects	10.5	23.7	23.1	38.5	3.3	46.6
Non-evaluation	18.4	18.4	30.8	15.4	6.7	11.7
Self-evaluation	34.2	10.5	30.8	19.2	0.0	3.3
Remedial Plan						
About Mechanics	2.6	44.7	3.8	57.7	1.7	25.0
About Content	31.6	5.3	30.0	7.7	28.3	5.0
About Adjustment	44.7	42.1	50.0	46.2	45.0	45.0
Development Plan						
About Mechanics	0.0	18.4	0.0	15.4	1.7	5.0
About Content	15.8	10.5	7.7	0.0	5.0	3.3
About Adjustment	5.3	15.8	7.7	11.5	20.0	31.7

It is observed that the primary and intermediate grade teachers tend to be generally less critical than the high school teachers. A chi square of 3.1211, significant at only about the .25 level, is obtained for the mechanics of the second story but of 11.4489, significant at the .01 level, is obtained for criticism of the content of the first story.

The differences relative to praise are less striking than those relative to criticism. All three groups are freer with praise than with criticism, however. Differences relative to praise of the mechanics of the first story are at between the .05 and .10 level of confidence (chi-square = 5.4151). The elementary teachers appear to be freer with praise than the high school ones. Differences relative to praise of the content of the second story are not statistically significant.

The three groups according to educational level differ at the .001 level on the matter of using self-evaluative approaches (chi-square = 23.8303). The high school teachers make far less use of self evaluation than do the elementary teachers.

There is a tendency for the intermediate teachers to be most concerned about remedial programs for both mechanics and content and for high school teachers to be least concerned (chi squares of 9.3223, significant at the .01 level, and 3.9283, significant at less than the .10 level of confidence respectively).

The differences relative to remedial plans for adjustment are not statistically significant but the differences relative to long-range plans for adjustment are statistically significant (chi square = 5.2886, significant at between the .05 and .10 level of confidence for the first story and chi square = 5.6482, significant at the same level for the second story). Quite interestingly, the high school and college teachers more frequently recognize the role of adjustive factors than the primary and intermediate teachers.

Other Analyses

Myers analyzed the responses in terms of four instructional approaches: creative, critical, implicit, and remedial. Consideration was given to the attitudes of the respondents with regard to children's writing. No attempt was made to interpret a set of responses as belonging to a single category. Responses were simply scored according to the number of times a respondent used one of the four approaches. The creative category was scored when any reference was made to the creative aspects of the stories, imagination, originality, cleverness, humor, and the like. Attempts to involve the pupil in ideas about his story were also scored in the creative category. The critical category included remarks about consistency, repetition, diction, sentence structure, balance, paragraphing, length, and the like. If the respondent attempted to instruct a student by example, whether by asking the pupil to read or to listen to other stories or by using picturesque and stimulating words himself, his instructional approach was labeled as implicit. References to spelling, penmanship, punctuation, grammar, and neatness were placed in the remedial category.

In this analysis, Myers used all responses except those submitted by the graduate students in the mental health course. The most critical respondents according to the Myers analysis were the undergraduate students (about 62 per cent compared to about 20 per cent for the experienced teachers, statistically significant at the .01 level of confidence).

Instructing by example was a strategy mentioned most frequently by the primary teachers (58 per cent), but was mentioned by only 18 per cent of the intermediate teachers, 40 per cent of the high school teachers, 22 per cent of the undergraduate students and none of the student teachers. These differences among groups are significant at the .01 level of confidence. The remedial approach was mentioned at about the same rate by all sub-groups.

Since responses such as those being discussed do not lend themselves easily to analysis, it might be profitable to examine strategies which were representative of creative, critical, implicit, and remedial orientations. The first strategy is illustrative of the creative approach which attempts to involve the pupil in ideas. This strategy was designed to help the author of the first story.

> I would begin by showing the child that I am genuinely interested in his writing, and would try to enlist his interest in our cooperative effort to find out how his writing might be made more interesting. I would talk about ways of adding on to his thought, about ways of building images--pictures--in the mind and then getting them down on paper. I would discuss with him not so much techniques of writing as ways of thinking about a thing; I would encourage him to suggest as many different ways of talking about a cat that does not scratch as he can, asking him to consider how the cat looks, where it lives, how it feels, and what else it does. Then I would try to get him to generalize about this way of writing, showing him that any subject can be made more interesting by thinking of it in different ways. I would encourage him to be bold--even "crazy"--in his thinking.

The following strategy is faithful to the attitude of the respondents who were disturbed by the inconsistencies found in the first story.

> The sentences seem to oppose each other. The first two sentences display revenge. The third and fourth sentences express kindness. I would ask the author just what he would do--either express kindness or hostility. The title also is not indicative of the lines that follow. I would ask the author his reasons for using such a title and then to explain if he felt he carried out these reasons.

Interestingly enough, the respondent whose strategy so aptly typifies the critical approach to creative writing also exemplifies quite well the remedial approach in her remarks to the author of the second story.

> I would work on correct spelling, capitalization, and punctuation. I would ask the child what he meant by the "hot house" and what the last sentence means in relation to the first paragraph. The child also needs help with paragraph structure and handwriting.

Many of the respondents whose strategies involved teaching by example offered the first author models in the form of books, as did the respondent who wrote as follows:

> First, I would praise the author for the mechanical part of his story, which he has done very well. Then I would have available some well-written, short stories which contain a simple plot or idea and ones which make good use of descriptive adjectives. I would suggest we read these together, and decide why these were good stories. Next I would suggest we make a comparison of these stories with his story and judge it by the criteria we had set up together.

My purpose in using this procedure would be that through making this comparison the child would be able to observe how he might make improvements in his story and future stories he would be writing.

Most of the strategies which were analyzed were not so easily classified as those just given, although it is evident that these too contain elements which are not entirely consistent with the central theme. Many of the respondents incorporated all four approaches into their strategies. From a practical viewpoint, this eclecticism is often effective. It tends to reduce the analyst's confidence in his taxonomy, however. There are some strategies which suggested other classifications. A few of them, such as the two which follow, shouted rather than suggested.

> There seems to be a feeling of self defense at first but the story implies that the child has a hidden desire to make a pet of the cat and is evidently hoping the cat will be friendly. I would question him as to why he would want to make friends with the cat if the cat scratched him. Would he like to have a pet? Perhaps the answer might be, "I want a cat but I do not want him to scratch me." Why might a cat scratch him? Did he think the cat might be afraid of him? Was he afraid of the cat? Could he scratch a cat back? How could he get even with him?
>
> On the other hand, the child's liking for the cat seems to outshine his fear of being scratched. Did the child think he might like the cat or the cat like him? How could he get the cat to like him? If the cat did like him what things could he do for the cat? It looks as though the child would do his utmost to gain the cat as his friend--even to the point of feeding him.
>
> The strong determination to have the cat like him shows up in the child's rather deliberate concise statements which perhaps coincide with his almost perfectly written letter.

(At this point it might be interesting for the reader to go back to the first story to appreciate better the extent to which the respondent was able to see psychological implications between the young author and the imaginary cat.)

> There seems to be a desperate appeal for friends in this story. Perhaps there are similar circumstances which exemplify the child's own life. Maybe he himself was a lonely street urchin--or could not make friends easily. Why was the cat so lonesome and tired? Had the child ever felt lonely?
>
> A vivid imagination was displayed in the story--cold and dark--so lonely--also, why would the cat go to a hot house? Could there be a contrast there between the cold, dark, and lonely world and the warm friendly hot house? What is a hot house? Did he have one at home or was this something his imagination had thought up?
>
> A strong feeling of security was shown. Did the child think the cat was happy to be accepted by all these fireflies?

What made them think he was a firefly? The fact his eyes glowed gave him something in common with the others. Did the boy have a lot of friends? Do you think the fireflies like him so well they sat on him to keep him there? Why did Chester the Cat have a hot foot--was it from being in the hot house or because he used his claws in struggling to get free?

The story leaves one wondering what took place as the ideas weren't too clearly expressed. The short disconnected thoughts were due probably to difficulty in spelling and his own untidy appearance perhaps contributed to his rather carelessly written letter.

Both strategies were written by the same person. One wonders if she had left a psychology class or her television set before writing them.

It was apparent in analyzing the questionnaires that the primary teachers often attempted to involve the pupils more deeply in their stories, but it was not as evident how deeply involved many of them get with their pupils, except for this second-grade teacher:

> After receiving these stories and others which were written by the group members, I probably would not say anything to the individuals. I however would share with them some added information about cats. I would show them a live cat which I had put inside the surprise box preceding the creative story motivation. We would take the time to appreciate it together and talk about it in our own way. In a few minutes time, I would ask them, "WHAT ARE THE MOST INTERESTING PARTS OF A CAT, AND WHY ARE THOSE PARTS INTERESTING?" (As we would be watching the cat together and experiencing the presence of a favorite pet, the following responses might be heard:)
>
> ..."His tail because it looks like the top of a furry question mark."
>
> ..."His glowing eyes because they match the night time stars."
>
> ..."His back because it looks like an arch in an outdoor croquet game."
>
> ..."His whiskers because they look like the bristle stick ups on a hair brush."
>
> When someone mentions his scratchers, we will discuss what the cat uses that part of his body for. We will discover together that he has the privilege to use his scratching feet in his own way, just as we can use our hands to help protect us in our daily living.
>
> We could talk with and listen to each other tell of "PLACES WHERE CATS COULD HAVE THEIR SCRATCHING LESSONS." We might hear things like this:
>
> ..."On a swaying down apple tree."
>
> ..."On a white wooden guard fence around the yard."
>
> ..."On children's necks and noses."

We could compare our hands to the cat paws and discuss "THINGS THAT HANDS CAN DO THAT PAWS CAN'T DO." Some children might respond in these ways:

..."My hands can help me turn upside down somersaults."

..."My hands can go inside puppets and make them do their work."

..."My hands can go in a pie and pull out a plum."

Upon concluding these talking topics, the entire group will have received a better understanding of how people and animals react in different ways to the world around them. This discussion might be especially worked in for the author of story number one who thinks cat scratching lessons are not fun for people to receive. It would be a just-right time to have Wanda Gag's book "MILLIONS OF CATS" available for extra reading. I hope that the author of the first story is the lucky child to take this book. It would help him understand how wonderful cats really are and he would read it in such a humorous way.

When these children leave school, I would enjoy finding the time to relax and read the stories which came from the hearts of my friends. I will have not said anything to the individual authors about their stories, because it is their privilege to write as they feel, and to be free at all times to say as they please without wondering if TEACHER will like it.

After reading each story in my own curious way, I would write a personal note to each child on his story paper as I do in my own day to day teaching.

On story number one I would write:

> Dear__________, I am glad that you decided to feed your cat and be so kind to him. I think any cat would like to be your pet. I wish I were as kind and as good as you are. Your friend, Miss G.

I will note from this story that ____ lacks organization in planning his ideas. In days to come I would see a need to work closer with him in the arranging of thought sequences. I would listen more carefully to him in talking times for proper placing of the order of events to see if he often changes his mind.

On story number two I would write this note:

> Dear__________, I'd like to go out prowling with Chester Cat and meet all the lighted fireflies. I've always wanted to touch one and see how they make their magic night time lights come on. I think that would be the biggest adventure in the whole wide world for me. Your friend, Miss G.

I would secretly know that this child is very creative and uses his imagination well. I would know that he needs a great deal of extra help in spelling. (But he'd never guess that by my note to him.)

The individual help for spelling time would not come when he is doing his creative writing. (At that time it is the word thought and the expression of ideas which we are seeking. There never is a worry to him about how words are spelled in his original child-made stories. It is then when he is free to say the very special things that he feels inside.)

This child will have guided help with spelling in his free time. His misspelled words might help me in my selection of spelling words for him. It seems that as there is a need to write words in story form, that this is the time for him to learn them in his spelling. They are his words. He is ready now. It's my job to help him. As his spelling improves, his neatness in work will also come easier because erasers will need a vacation time.

As I'd finish reading the stories created from each child and after adding personal notes on the ungraded papers, I would know that I had just finished talking with each of my children in a more personal way than making oral conversations with them which other neighboring children could also hear. (Conversations which could cause embarrassment and take spark out of future creative thinking.) At this time I would also know that I was holding in my hands the inside word pockets of their minds which came from within during an atmosphere of freedom "TO SAY IT THEIR OWN WAY." I'd know that I was holding hints which will guide me to their individual needs.

I'd be certain that when they come into our room the following morning that each child would know that I appreciated their individual stories by the personal notes which they can read and keep forever.

They won't know that I have learned a few new secrets about them which will help them on this day and days to come.

They will know that when they say, "GOOD MORNING, TEACHER," that I'll be glad that we can be together for another happy day when we are free to be ourselves, just the way we are.

A Final Thought

The values of the teachers who wrote the plans quoted above were brought out in sharp relief when they responded to the request to offer a solution to the problem. What may have been brought out also is the tendency of many students to "pad" their answers or to give unrealistic answers. Even experienced teachers are sorely put not to dress up their replies to questions concerning classroom practice. We all like to make a good impression. It is therefore difficult to assess the significance of the analysis offered above. Notwithstanding the artifices and delusions of the respondents, however, their values do shine through.

If someone devotes a reasonable amount of thought to problems such as those posed in the questionnaire, he is bound to reveal something of his attitudes.

Discussion

As has already been mentioned the subjects in this study were probably acting on their "best behavior" in terms of what they consider ideal practices. The volunteer, experienced teacher group had attended workshops or lectures conducted by the author on encouraging creative development and were competing to offer solutions which would promote creative growth. The graduate students and experienced educators enrolled in a course on personality development and mental health, had been given considerable orientation concerning conditions conducive to mental health and creative growth. They were also competing for grades. The undergraduates were assured that their responses would not count on their grades but they too had received considerable orientation concerning teaching for growth in creative writing. In spite of all of these factors which might have influenced the subjects to offer "ideal" solutions, responses involve plans which are far from ideal in the light of what we know about conditions for fostering creative growth. Many of the plans offered reflect again man's strong needs to punish and to pity. Criticism and praise are among the favorite weapons and defenses of the respondents. Appeals to the child's own creative problem-solving skills, the use of self-evaluative approaches, and the like are perhaps too rarely used. Outside of the mental health students, few of the respondents recognize that the mental health of the children who wrote the stories may be interfering with their performance and that these children may not do either more creative or more correct writing until they are able to cope better with problems of adjustment.

As we examined the responses submitted by subjects, the idea occurred repeatedly that teachers apparently lack the concepts and/or vocabulary with which to communicate with children about their creative writing. It occurred to us that teachers might gain these concepts and become skilled in their use by evaluating the creative productions of their students according to the procedures described in earlier chapters of this volume for assessing the originality and the interest of imaginative stories.

Chapter 17[1,2]

PEER PRESSURES IN HOMOGENEOUS AND HETEROGENEOUS GROUPS

Research in social psychology (Pepinsky, Hemphill, and Shevitz, 1958; Pepinsky and Pepinsky, 1958; Hemphill, 1961) has shown repeatedly that the evaluative behavior of one's peers in small groups can be a powerful inhibitor of original ideas. Studies of adult groups (Pepinsky and Pepinsky, 1958) indicate, however, that those individuals who produce original ideas in groups have developed identifiable strategies which enable them to counteract these inhibiting forces to a considerable extent. Pepinsky (1960, p. 85) has identified seven strategies of "productive non-conformity." The productive nonconformist, according to Pepinsky, translates his own ideas into the language of the other members of his group so that they can see his contribution as instrumental to their own needs, or at least not in conflict with them. He states his criticism in a positive and constructive way and makes it evident that basically he stands for something that commands the respect of others in the group. He minimizes personal threat by listening to others and according them respect and dignity. He establishes a kind of "credit rating" and "buys" increased freedom over a period of time by initial service in terms of existing demands and requirements. He emphasizes the job to be done, rather than "personalities" and "status." He is good at timing his ideas and is able to delay responses as well as act upon them.

It is the thesis of this chapter that by the time children reach the intermediate grades they have developed some rather well defined small group strategies for controlling their more creative members and that highly creative children have in turn developed some rather well defined counter strategies for maintaining their productive nonconformity or creativity. It is further hypothesized that these strategies are different in homogeneous and heterogeneous groupings, whether the grouping be based on a measure of creative thinking ability or upon some other measure of intellectual talent such as Mental Age or Intelligence Quotient.

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[1] I was assisted in the preparation of this chapter by Dr. Kevser Arsan, University of Istanbul, Turkey.

[2] A portion of this chapter has appeared in W.W. Charters, Jr. and N.L. Gage (Eds.) Readings in the Social Psychology of Education, Boston: Allyn and Bacon, 1963, pp. 133-140.

Classroom Grouping and Creative Activities

In assigning creative tasks in elementary-school classes, it is frequently necessary to divide pupils into small groups. If each group is to undertake a different task, the basis for the grouping is usually some kind of homogeneity of interest. If all groups are assigned the same task as a common educational experience, the problem is different. There are many possibilities. Strevell and Oliver (1957), for example, have identified 24 types of classroom grouping practices. If the task to be assigned requires creative thinking, one logical basis for grouping would be some kind of score on tests of creative thinking. The question then becomes, "Should the groups be homogeneous or heterogeneous?"

In grouping pupils for tasks requiring creative thinking, one must consider a number of special problems. The groupings should help to create conditions which will free each child to think, to express his thoughts, and to have them considered honestly. Disruptive social stress should be reduced as much as possible, and positive, productive interaction should be fostered.

There is a considerable body of literature concerning homogeneous and heterogeneous grouping in reading, mathematics, and other subjects. Using scores on tests of reading achievement as the basis of homogeneity and heterogeneity, research workers have generally given the nod to homogeneous grouping (Barbe and Waterhouse, 1956; Heyl, 1955). Some, however, stress flexibility in grouping (Bremer, 1958; Canfield, 1957; Heyl, 1955).

Hardly any attention has been given, however, to the special problems of grouping for tasks requiring creative thinking. One exploratory experiment with young adults as subjects in laboratory tasks requiring group creativity has been reported by Fiedler, Meuwese and Oonk (1960). Homogeneity and heterogeneity were based on religious and collegiate affiliations. The subjects were students in Calvinist and Catholic colleges in Amsterdam, Holland. The same subjects took part in both homogeneous and heterogeneous groups under both formal and informal organizations. Under both forms of organization, the heterogeneous groups showed much social strain and communication difficulty. The homogeneous groups showed little social strain and had few problems of communication.

Some of the findings from Elizabeth Drews' (1961) studies of homogeneous and heterogeneous groupings according to ability in ninth-grade English classes provide clues concerning what we may expect in creative activities. Her results indicate that slow students read more, recited more, were more confident, liked school better, and were more accepted socially and intellectually in the homogeneous groups. Superior students wrote many more compositions, did more research, discussed at a more mature level, used more difficult words, expressed more complex and abstract thoughts, and were more interested in learning in homogeneous than in heterogeneous groups. They were also much more modest in their ratings of self in relationship to others.

Procedures

Subjects

The subjects of the study were fourth-, fifth-, and sixth-grade pupils in three Minneapolis elementary schools. School A is a private school which limits its enrollment to twenty-five pupils per class. Schools B and C are public schools, each having two classes at each grade level.

In 1959, the pupils in each class of School A were divided heterogeneously into groups of five on the basis of Form A, Test of Imagination. In 1960, each class was divided homogeneously on the basis of Form DX, Test of Imagination. (See full description of tests in Chapter 4.)

In School B, one class in each grade was grouped homogeneously and the other heterogeneously on the basis of creativity scores on Form DX. In all, twenty groups from this school were included in the study. All were tested in 1960.

In School C, one class in each grade was grouped homogeneously and the other heterogeneously on the basis of intelligence quotients as determined by the California Test of Mental Maturity. In this school, twenty-three groups were tested, all in 1960.

To summarize, subjects were grouped according to the following design:

School	Year	4th Grade	5th Grade	6th Grade	Basis of Grouping
A	1959	He	He	He	Form A
	1960	Ho	Ho	Ho	Form DX
B	1960	He	He	He	Form DX
	1960	Ho	Ho	Ho	Form DX
C	1960	He	He	He	Calif. Mental Maturity
	1960	Ho	Ho	Ho	Calif. Mental Maturity

Homogeneous groups were formed by ranking all pupils in a class on the measure (intelligence quotient or creativity score) used as the basis for grouping and placing the first five pupils in one group, the next five in a second, and so on. In forming heterogeneous groups, one of the top-ranking pupils was placed in each group, followed by one of the next highest ranking pupils, and so on. Subjects were not informed of the basis used in forming the groups. Each of the five-person groups were about equally divided insofar as sex is concerned.

Creative Thinking Tests

As already indicated, two different batteries of creative thinking tasks, Form A and Form DX were used as the basis for the grouping. Form A consists of six tasks adapted from Guilford's battery (1951). These include Uses of Common Objects (Tin Cans), Impossibilities, Consequences, Situations, Problems, and Improvements. Form DX consists of the following tasks: Product Improvement (Toy Dog), Unusual Uses of Toy Dog, Unusual Uses of Tin Cans, Circles (sketching objects with circles as main part of design), Asking Questions, Guessing Causes, and Guessing Consequences. Both batteries were scored for fluency of ideas (number of ideas), flexibility (number of different categories of approaches represented by ideas), and originality (uncommonness of ideas). Form DX yielded in addition scores for inventiveness, constructiveness, curiosity, and hypothesis-making. The total raw score was used in making the groupings.

Experimental Procedures

In each class, all groups were tested simultaneously, each in a different room under a trained experimenter who made detailed observations of the interaction. Tabulations were made for ideas or actions initiated, uses discovered, explanations advanced, and reasons suggested during the exploratory period. In addition, the experimenters described how the group got organized and underway with the task, how the members grouped themselves, the general activity level of the exploratory period, the special roles of members, how the demonstrations were planned, special roles in planning and demonstrating, and the like.

To set the creative scientific task, after the homogeneous or heterogeneous groups had been formed, each group was provided a box of science toys and toy parts obtainable from Science Materials Center, the Library of Science, 59 Fourth Avenue, New York 3, New York. Each toy illustrates at least one basic principle of science. Science Toy Collection Number 2 was used in the 1959 administration in School A. This collection includes a sparkler, a finger trap, a pin trick, a four-ball puzzle, a topsy-turvy top, a blow ball, a flying saucer, and nutty putty. To this collection was added a magnifying glass, a magnet, and a whistle. Science Toy Collection Number 3 was used in all other administrations and includes a bang gun, a string telephone, a siren, a busy bee, a calliope whistle, a cat cry, a Tower of Hanoi puzzle, a tetrahedron puzzle, and other puzzles. A magnet and a magnifying glass were added to this collection.

Before a class was divided into groups, the author gave the entire class the following orientation: "Today, I would like to ask you to help us find out more about the ways people learn how to think of new ideas. During this next hour, we have arranged what is a kind of test of how inventive you can be about science things, and how well you can develop ideas as groups.

We will divide you into groups of five and each group will work in a separate place with a different observer. Each group will be given a box of science toys. Your job will be to find out as many things as you can that these toys can do or be used for. Some of you will recognize the scientific principles that these toys were made to illustrate. But we want you to be concerned about any possible uses of these toys, not just the ones they were made for.

"For 25 minutes, you may experiment with these toys and try to find out as many things as you can that you can do with them. Then we will give you another 25-minute period in which to demonstrate what these toys can do and explain the principles behind them."

"The object is to see how many science principles you can demonstrate and explain. We are not interested in individual performance but in how well the group does. One of my helpers will be with each group and will take down your ideas and record some things about the way you do your job. In addition to seeing how you can use and figure out scientific principles, we want to see how you work as a group on problems like this."

"To make this more interesting, we shall award a prize to each member of the group which demonstrates and explains the largest number of science principles."

The membership and places of meeting for each group were then announced. When the five-person groups had assembled, the experimenter gave each person a colored arm band, according to a pre-determined code. He then gave the following instructions for the exploratory phase:

"Here is a box of science toys. All of them were made to illustrate some scientific principle. I am sure that you can think of many other uses than the ones originally intended. Your job is to find out as many things as you can that these toys can do and explain them. Don't give up when you have discovered one use; there are several possible uses for each toy. You can combine them in different ways. You will have 25 minutes to do this."

At the end of this phase, the following instructions were given:

"Now, I would like for you to demonstrate these toys to me just as though I were a class you are trying to teach what these toys can do and why they do it. You will have only 25 minutes for this. Remember that group performance is what counts. First, demonstrate what the toy can do. Second, explain the principle or reason why it does what it does. All right, go ahead."

At the end of the experiment, each subject was asked to rank each member of his group, including himself, according to the value of his contribution to the success of the group. In all the 1960 administrations, subjects were also asked to indicate how well they had enjoyed the activity and how they thought their own group had performed in comparison with the others in the class.

Upon completion of the experiment, the observers prepared their records which consisted of the tabulations and descriptions for the exploratory and planning phases, accounts of the demonstrations and explanations, and other observations of interaction during the ratings and demonstrations. Except for checks on reliability of observers, each group was observed by only one experimenter. The same persons observed both homogeneous and heterogeneous groups on various occasions.

Analysis of Data

Using categories developed in a pilot study, a careful analysis was made of the records of interaction between the group and the most outstanding member on whatever measure was used as the basis for the grouping, whether homogeneous or heterogeneous. This means, of course, that there was relatively little difference between the most outstanding member of the homogeneous groups and the other members of a given group.

A score was obtained for each individual on number of ideas initiated, number of ideas demonstrated and explained, reported enjoyment of the activity, self-ranking of performance, and rating of own group. At each of the five ability levels, comparisons were made between the homogeneous and heterogeneous groups separately for each school.

The record of each group was then analyzed for positive and negative signs of interaction. This was done by first drawing up lists of words which would be accepted as indicators of social stress and of positive, productive interaction. A high degree of agreement ($r = .95$) was achieved by raters in scoring records according to these lists.

The following terms appearing in the records were classified as indications of disruptive social stress or tension:

> Bickering, fighting, squabbling, uncontrolled behavior, disorder, disorganization, dominating, squelching, reprimanding, loss of temper, apathy or passivity, refusal to cooperate, loss of interest, sarcasm, disruptive talking and joking.

The following terms were classified as signs of positive, productive interaction or tension-reducing behaviors:

> Co-operating, helping, working together, organizing, absorption in task, praising one another, respecting others' ideas, listening, considering others' ideas, trying out others' ideas, communicating ideas, consulting with one another, congenial, interested, questioning, curious, etc.

A tabulation of both positive and negative signs was made for each group. Homogeneous and heterogeneous groups in each of the three schools were compared by means of chi-square analysis.

Results

Strategies of Group Control

Table 17.1 contains the results of the analysis of the observed strategies of group control of the most outstanding group member (most creative or most intelligent as the case might be). Several observations appear to be important.

Table 17.1

Observed Strategies of Group Control of Most Outstanding Group Member with Heterogeneous and Homogeneous Grouping According to Scores on a Creative Thinking Test and According to Intelligence Quotients

Type of Pressure of Strategy or Control	Per Cents			
	Creative Hetero. N = 26	Creative Homo. N = 24	IQ Hetero. N = 11	IQ Homo. N = 12
Open aggression and hostility	19	4	0	0
Criticism, ridicule	19	0	0	8
Ignoring, rejection, unresponsive	31	13	18	8
Use of organizational machinery	12	4	9	0
Assignment of organizational responsibility	19	4	73	17
Lack of structure	19	17	0	83
No pressure observed	19	71	18	58
High IQ member pressured to produce ideas	4	13	64	0

First, high ability members were more likely to experience group pressures in heterogeneous than in homogeneous groups, regardless of the basis of the grouping. In the creatively homogeneous groups 71 per cent experienced freedom from pressure and in the homogeneous groups based on IQ 58 per cent enjoyed such freedom, compared with 19 and 18 per cents in the heterogeneously formed groups. This difference is significant at the .01 level of confidence.

Second, high IQ members experienced a different kind of pressure from that experienced by highly creative members. This is especially clear in the heterogeneous groups based on IQ where 64 per cent of the groups exercised rather obvious pressures on the high IQ member to produce ideas. Even in the groups formed on the basis of measures of creative thinking, some of the high IQ members experienced such pressures.

In a considerable number of cases, the high IQ member was unable to meet this expectation to produce ideas with the result that both he and the group were disappointed in his performance. For example, one observer recorded the following comment about the group which contained the boy who had the highest IQ of any member of the class:

> "Blue (lowest IQ) was really the 'hero' of the group and was its sparkplug. The group openly expressed the feeling of being let down by White (highest IQ) when he was unable to respond to their urging to supply ideas. He recognized that this was expected of him but seemed to be unable to 'get going' and expressed disgust concerning his performance."

Group members identified as outstanding on the basis of their creative thinking ability generally experienced quite a different kind of pressure. Instead of urging highly creative members to produce ideas, groups exercised pressures to reduce their production of ideas by open aggression and hostility, criticism and ridicule, ignoring and rejecting, restraining by organizational machinery, or saddling them with organizational responsibility. This is rather ironic since the highly creative members may be better able to produce ideas to help the group than are highly intelligent members. It is understandable, however, since the highly intelligent youngster is likely to have a reputation for having the "right" answer rather consistently. The highly creative youngster, however, is not likely to have such a reputation.

It is interesting to note that the homogeneous groups based on IQ tended to experience the pressure of lack of structure more frequently than any other type of group. Apparently the heterogeneous groups acted upon the structure built into the groups by different levels of ability (creativity or intelligence). What is most interesting, however, is the fact that the homogeneous groups based on creative thinking ability tended not to experience this difficulty.

It is interesting to note that high IQ members in heterogeneous groups are more likely to be given organizational responsibility than highly creative members in heterogeneous groups (73 per cent and 19 per cent respectively, significant at the .01 level of confidence). A closer analysis of the records shows that in the few cases where highly creative subjects were given organizational responsibility, they were also in the top 20 per cent on the intelligence test measure.

Counteraction Strategies

The data derived from the analysis of the observed counteraction strategies of the most outstanding group member (as determined by creativity score or IQ as the case might be) are presented in Table 17.2.

Table 17.2

Observed Counteraction Strategies of Most Outstanding Group Member with Heterogeneous and Homogeneous Grouping According to Scores on Creative Thinking Tests and According to Intelligence Quotients

Type of Reaction or Counteraction Strategy	Per Cents			
	Creative Hetero. N = 26	Creative Homo. N = 24	IQ Hetero. N = 11	IQ Homo. N = 12
Compliance	19	8	18	42
Counteraggressiveness	15	0	9	0
Persistence or calm resistance	37	13	0	0
Apparently ignoring criticism or attack	15	0	0	0
Clowning, giggling, humor	12	0	0	0
Silence, preoccupation, leaving field	27	17	0	17
Inconsistent performance	15	4	4	0
Solitary activity, working alone	27	33	18	17
Filling in gaps, but not structuring.	42	13	18	42
Initiating structure, leading, coordinating	46	33	73	33

Again, only the most remarkable observations will be mentioned.

Perhaps the most remarkable observation to be noted in Table 17.2 is the fact that only in the creatively heterogeneous groups do we find many counteraction strategies. These are rather evenly distributed among compliance, conteraggressiveness, persistence or calm resistance, the apparent ignoring of criticism, clowning and giggling, silence and pre-occupation, inconsistent performance, and solitary activity. Almost one-half of them, however, resorted to the strategy of filling in the gaps when other members bogged down or when other members of the group were unable to produce ideas. Again, these phenomena are easy to understand, since it is only in the creatively heterogeneous groups that there were very many restraining pressures against the most able member (as identified by creativity and IQ). These pressures in the heterogeneous groups formed on the basis of IQ were in the direction of increased production.

Another notable observation in Table 17.2 is that the most able members of heterogeneous groups are more likely to initiate structure than are the most able members of homogeneous groups. Quite interestingly, however, the highly creative youngster seems to be somewhat more reluctant to initiate structure than the high IQ youngster in heterogeneous groups.

He seems instead to fill in the gaps when others are unable to supply the answers or ideas needed.

Number of Ideas Initiated

The mean number of ideas initiated by subjects in each of the five ability levels in homogeneous and heterogeneous groups in each of the three schools studied is shown in Table 17.3 together with tests of significance. In School A, it will be noted that in the homogeneous groups, those at the second, fourth, and fifth ability levels initiated significantly more ideas than did their counterparts in the heterogeneous groups. In the heterogeneous groups, it will be noted that there is a tendency toward a linear relationship between ability level and mean number of ideas initiated. This tendency does not prevail under homogeneous conditions; those in the fourth and fifth ability levels diverge from the linear tendency.

Table 17.3

Mean Number of Ideas Initiated by Pupils of Five Ability-Levels in Homogeneous and Heterogeneous Groups in Three Elementary Schools and Tests of Significance

Ability Level	Homogeneous Number	Homogeneous Mean	Heterogeneous Number	Heterogeneous Mean	F-Ratio	Level of Significance
School A						
1 (Most Creative)	14	13.07	15	13.00	0.00	NS
2	14	12.71	13	8.53	4.41	<.05
3	13	7.61	15	5.86	0.96	NS
4	13	8.84	14	5.21	4.30	<.05
5 (Least Creative)	14	13.42	13	4.69	17.47	<.01
School B						
1 (Most Creative)	8	8.00	13	11.30	1.60	NS
2	8	10.30	12	9.50	0.06	NS
3	8	8.90	13	9.20	0.08	NS
4	7	5.40	12	5.50	0.00	NS
5 (Least Creative)	8	7.00	13	3.75	2.11	NS
School C						
1 (Most Intell.)	12	5.60	10	10.00	12.07	<.01
2	12	7.10	10	7.30	0.03	NS
3	13	9.00	10	5.40	4.62	<.05
4	13	12.70	10	5.00	8.92	<.01
5 (Least Intell.)	13	9.13	10	7.90	0.35	NS

In School B, there are no statistically significant differences at any ability level (quintile) under the two conditions. The trends noted in School B, for subjects at the second and fifth levels of ability to initiate more ideas in homogeneous than in heterogeneous groups, were not statistically significant. Those at the highest ability level, however, tended to initiate more ideas in heterogeneous than in homogeneous groups. Again the linear trend between ability level and mean number of ideas initiated appears in the heterogeneous but not in the homogeneous groups, the second and fifth ability levels diverging most sharply from the linear trend.

In School C, where IQ was the basis for grouping, those in the highest ability level in heterogeneous groups excel their counterparts in the homogeneous groups, while the reverse is true for those at the fourth ability level. Contrary to what was found in Schools A and B, where creativity scores were used as a basis for grouping, there is no linear trend under any condition between IQ level and mean number of ideas initiated. The linear trend in the heterogeneous groups was upset by those in the lowest ability level who excelled their peers at the second, third and fourth ability levels. In the homogeneous groups, there is almost a linear trend in reverse. The lowest mean was achieved by groups composed of children with the highest IQ's, the highest by those at the fourth and fifth levels.

Ideas Demonstrated and Explained

Table 17.4 shows the mean number of ideas demonstrated and explained

Table 17.4

Mean Number of Ideas Demonstrated and Explained by Pupils of Five Ability Levels in Homogeneous and Heterogeneous Groups in Three Elementary Schools and Tests of Significance

Ability Level	Means		F-Ratio	Level of Signif.
	Homogeneous	Heterogeneous		
School A				
1 (Most Creative)	7.49	12.46	2.04	NS
2	6.92	9.22	1.56	NS
3	4.61	7.26	1.99	NS
4	5.30	4.85	0.10	NS
5 (Least Creative)	8.35	5.61	3.51	NS

Table 17.4 Cont.

Ability Level	Means		F-Ratio	Level of Signif.
	Homogeneous	Heterogeneous		
School B				
1 (Most Creative)	5.30	6.23	0.35	NS
2	4.80	7.50	1.78	NS
3	2.30	5.30	4.90	< .05
4	2.20	5.33	5.22	< .05
5 (Least Creative)	8.75	4.30	10.34	< .01
School C				
1 (Most Intelligent)	6.90	11.00	2.24	NS
2	10.40	8.10	0.58	NS
3	5.70	4.00	2.13	NS
4	5.60	7.90	1.22	NS
5 (Least Intelligent)	7.26	7.80	0.00	NS

by subjects in the five ability levels in homogeneous and heterogeneous groups in each of the three schools, together with tests of significance. It will be noted that none of the differences is statistically significant in School A. The linear trend between ability level (quintiles) and mean number of ideas demonstrated and explained is spoiled somewhat by those in the lowest group. In the homogeneous groups, those at the lowest ability level (quintile) actually achieved the highest mean of any ability level.

In School B those at the third and fourth ability levels (third and fourth quintiles) demonstrated and explained significantly more ideas in heterogeneous groups than in homogeneous groups. The reverse is true, however, for those in the lowest ability level. As in School A, those in the lowest ability level turned in the best performance of any ability level.

In School C, the linear trend in the heterogeneous condition is disturbed by the fourth and fifth ability levels. Again, subjects in the highest ability level turned in a rather mediocre performance under homogeneous conditions.

Enjoyment of Task

Complete data concerning enjoyment of task were available only for schools B and C. As will be seen from Table 17.5, in these two schools

Table 17.5

Comparison of Reported Enjoyment of Science-Toy in Homogeneous and Heterogeneous Groups in Schools B and C

Degree of Enjoyment Reported	School B (Cr.)				School C				Total			
	Homo.		Hetero.		Homo.		Hetero.		Homo.		Hetero.	
	N	%	N	%	N	%	N	%	N	%	N	%
Very much; most fun of anything today	22	56	37	58	51	81	33	67	73	72	70	62
Quite well; would like to do again	15	38	19	30	9	14	12	24	24	24	31	27
All right; wouldn't mind doing again	2	6	8	12	3	5	4	9	5	4	12	11

there was a consistent tendency for pupils under homogeneous conditions to report greater enjoyment than those under heterogeneous conditions. The difference is statistically significant only at the second ability level, however, and this occurs in both schools. When tabulations are made of the number choosing each category for the entire school, the chi square is significant for School C but not for School B. In School C, 81 per cent of those in the homogeneous groups reported that they enjoyed the activity "very much" compared with 67 per cent in the heterogeneous groups.

Self-Rankings

There was a general tendency for the more able subjects in both schools to be more modest or self-depreciating and for the less able ones to be less modest or less self-depreciating under homogeneous conditions than under heterogeneous conditions. In School B, subjects at the top ability level were extremely self-depreciating in homogeneous groups. Their mean self-ranking is fourth, where the lowest ranking is five. They were significantly more self-depreciating than their counterparts under heterogeneous conditions (.01 level).

Table 17.6

Mean Self-Ranking of Performance on Science-Toy Task by Children of Five Ability Levels in Homogeneous and Heterogeneous Groups in Two Elementary Schools and Tests of Significance

Ability Level	Means		F-Radio	Level of Signif.
	Homogeneous	Heterogeneous		
School B				
1 (Most Creative)	4.00	2.69	8.19	<.01
2	2.70	2.25	0.99	NS
3	3.00	2.76	0.20	NS
4	2.60	3.25	0.67	NS
5 (Least Creative)	2.50	3.53	1.63	NS
School C				
1 (Most Intelligent)	2.90	2.50	0.33	NS
2	3.60	2.60	2.92	NS
3	3.90	3.10	1.11	NS
4	2.70	3.00	0.33	NS
5 (Least Intelligent)	2.50	3.53	1.63	NS

Rating of Group Performance

Only at the top level (quintile) of ability are there statistically significant differences between subjects in the two conditions in their ratings of their own group's performance. When creative thinking is the basis for the grouping, the top ability subjects rate their group's performance less favorably under homogeneous than under heterogeneous conditions. The reverse is true when IQ is used as the basis for grouping.

Social Stress

Comparisons of the homogeneous and heterogeneous groups in each of the three schools on the number of signs of disruptive social stress and positive interaction are presented in Table 17.7. The results are consistent from school to school, and in all cases the differences are significant at better than the .01 level of confidence.

Table 17.7

Number of Positive and Negative Interactions in Homogeneous and Heterogeneous Groups During Science-Toy Task

	Homogeneous				Heterogeneous			
	No. of	No. of	No. Interactions		No. of	No. of	No. Interactions	
School	Groups	Pupils	Positive	Negative	Groups	Pupils	Positive	Negative
A	15	70	136	53	15	70	36	77
B	8	39	53	32	12	63	52	73
C	12	63	107	37	11	55	63	53

X^2 (School A) = 46.3873; df = 1; p <.001
X^2 (School B) = 8.6940; df = 1; p <.01
X^2 (School C) = 11.3360; df = 1; p <.01

There were fewer signs of social stress in the homogeneous than in the heterogeneous groups. This result held when the same classes constitute the homogeneous and heterogeneous groups about a year apart, when one class at each grade-level was divided homogeneously and another in the same school divided heterogeneously, when pupils were grouped according to measures of creativity, and when they were grouped according to intelligence quotient.

Discussion

From the data presented it seems reasonably clear that we may expect greater disruptive social stress when we divide classroom groups heterogeneously than when we divide them homogeneously for creative activities. These results seem to hold both when the groupings are based on IQs and when they are based on measures of creative thinking. There did seem to be one major difference in the heterogeneous groups based on IQ and those based on creativity. There seemed to be far less effort to "unseat" the high-IQ member than the highly creative member. The status of the child with the high IQ seemed far more secure than that of the highly creative child. In fact, some groups seem to either demand or plead for the high IQ member to produce, whereas there was a tendency to restrain, reduce, or control the productivity of the highly creative child.

These results should not be interpreted to mean that teachers should always form homogeneous groups for creative tasks. There are signs that some homogeneous groups tend to be dull, uninteresting and unproductive when new ideas are required.

There seem to be times when it is advantageous to increase social stress. On the basis of research (Torrance, 1958) on the effects of varying intensity of stress, creative thinking is likely to be stimulated by increasing social stress to a point, after which thinking is disrupted and productivity diminishes. Thus, it would seem that a classroom teacher may within limits control the degree of social stress in work groups by choosing varying bases of grouping. Of course, still other methods of grouping need to be investigated and effects of groupings other than social stress need to be studied.

Although the findings concerning individual behavior are not nearly as impressive as those relevant to social stress, several rather strong tendencies are worth noting. One of these is the fairly consistent and frequently dramatic "all-out" performance of the low-ability groups under homogeneous conditions. The consistent linear trend in the heterogeneous group provides some rather convincing evidence concerning the validity of the tests of creative thinking used in forming the groups. Those who produced the most ideas on the written tests administered several months earlier also produced the most ideas in this task. The failure of this linear trend to hold under homogeneous conditions suggests that many of our ability measures, including intelligence tests, might lose some of their predictive value under conditions of homogeneous grouping, when the performance of one individual is not experimentally independent of that of his fellow group-members.

The findings concerning enjoyment of the activity and self-rankings support those of Drews (1961). They tend to contradict popular beliefs that homogeneous grouping will make children unhappy, especially the low ability ones, and that high ability pupils will become conceited and low ability ones overwhelmed by their feelings of inferiority. In both studies, the very reverse seems to be true.

Finally, it should be pointed out that the fact that in nature and society there is more stress in heterogeneous than in homogeneous groups does not mean that nothing can be done to reduce the stressfulness of heterogeneous groups. Similarly, the fact that there are no clear-cut differences in the production of ideas in homogeneous and heterogeneous groups does not mean, for example, that heterogeneous groups cannot become more productive than homogeneous ones. In fact, a study by Triandis, Bass, Ewen, and Mikesell (1962) indicates that in heterogeneous groups guidance can be given which will reduce stress and communication difficulties and create mutual trust and interpersonal attraction. When this was done, it was found that groups heterogeneous in attitudes produced more creative ideas than groups homogeneous in attitudes. In nature, however, they found the reverse to be true. In other words, when nothing was done to help groups reduce stress and communication difficulties, heterogeneous groups were less creative than homogeneous ones. The subjects of the study reported by Triandis and his associates, however, were adults and it remains to be seen whether children can be taught procedures whereby the stresses resulting in lack of productivity can be reduced.

The procedure of studying one another's semantic differentials employed by Triandis and his associates might not be appropriate for children, but there is no reason to believe that children cannot be taught some means for reducing these stresses and achieving greater creative production in heterogeneous groups than was observed in the study described in this chapter.

Summary

In three elementary schools, fourth, fifth and sixth grade classes were divided into five-person groups, homogeneously or heterogeneously according to scores on a test of creative thinking ability or according to an intelligence test. All groups (totaling 73) were administered the same task requiring creative behavior in working with science toys. In School A, the classes were grouped heterogeneously one year and homogeneously the second year, in both cases on the basis of a test of creative thinking. In School B, approximately one-half of the groups were arranged heterogeneously and the remainder homogeneously, according to scores on a test of creative thinking. In School C, the same procedure was followed except that group assembly was based on Intelligence Quotients as determined by the California Test of Mental Maturity. Observers' records were analysed for signs of social stress and positive productive interaction. Records were also analysed to classify the strategies used by groups to control their most outstanding member (on the specific criterion used as a basis for grouping) and the counter-action strategies used by group members to maintain their productivity. Analyses were also made of the number of ideas initiated by group members, the number of ideas presented by groups in their demonstrations, the degree of satisfaction expressed by members, and rankings of members' contributions to the success of the group.

It was found that high ability members are more likely to experience group pressures to reduce their productivity in heterogeneous than in homogeneous groups. High IQ members experienced pressures to produce ideas whereas highly creative members experienced restraining or inhibiting pressures to reduce their production of ideas. More specifically, the highly creative group members in heterogeneous groups experienced such pressures as open aggression and hostility, criticism and ridicule, ignoring and rejection, use of organizational machinery, and assignment of organizational responsibility. Although some of the highly creative children were consulted about ideas, there is no record of any of them having been pressured to produce ideas. High IQ members in heterogeneous groups are more likely to be given organizational responsibility than highly creative members in heterogeneous groups.

Only in the creatively heterogeneous groups are there many counteraction strategies; there are few pressures to counteract in the heterogeneous groups based on IQ and there is such little difference between the most able member in the homogeneous groups and the remainder of the group that little stress develops.

The most common strategies of counter-action are: compliance, counter-aggression, persistence, clowning and giggling, silence and preoccupation, inconsistent performance, solitary activity, filling in the gaps when others falter, and initiating structure. The most able member of a group is more likely to initiate structure in a heterogeneous group than in a homogeneous group and a highly intelligent member is more likely to initiate structure than a highly creative one.

Ability level for ability level there is no clear-cut superiority of homogeneous or heterogeneous grouping to result in superior performance. In five cases out of 15, however, there are significant differences in favor of homogeneous grouping and in one case the advantage is in favor of heterogeneous grouping. There is a general tendency for low ability pupils to produce more ideas in homogeneous than in heterogeneous groups. These advantages are less clear, however, when we count the number of ideas demonstrated and explained during the second phase of the Science Toy Task.

Although there is a consistent tendency for children in homogeneous groups to report a greater degree of enjoyment, the tendency is statistically significant only in School C where groupings were based on IQ.

In evaluating their own contributions to the success of their groups, the more able subjects tended to be more modest and self-depreciating under homogeneous than under heterogeneous conditions, when creativity is used as the basis for grouping but not when IQ is the basis.

There are significantly more signs of social stress observed in heterogeneous than in homogeneous groups in all three schools. Thus, it would seem that teachers by their choice of homogeneous or heterogeneous groupings may possibly influence the degree of social stress in groups working on tasks requiring creative behavior.

Chapter 18[1]

POSITIVE, NEGATIVE AND TROUBLE-SHOOTING EVALUATION

The author hesitated to include this chapter and the two which follow in this series of studies, since neither was a part of the original proposal for this project and since each had led to a separate series of investigations. He believes, however, that the account of this series of investigations of the role of evaluation in developing creative thinking would be incomplete without them. All three of them arose as a part of the author's search for an understanding of the basic problems of this research project. Thus, they are presented herein as exploratory studies which have inspired other studies each of which will occupy later its own volume. As is true of almost all exploratory studies, the three presented herein are faltering, tentative, and incomplete. The author, however, hopes that they will give the present volume a more complete and satisfying structure.

Much of the research on the evaluative behavior of the teacher has been concerned with the relative merits of praise, or positive evaluation, and criticism, or negative evaluation. Although the evidence has continued through the ages to be overwhelmingly in favor of praise, or positive evaluation, this accumulated evidence has somehow been unsatisfactory. It has not given teachers the guidance they need in making decisions about their evaluative behavior. Even though praise has rather generally produced better results than punishment or criticism, there has still been something rather unpredictable about praise and some observers have noted detrimental after-affects, even when the praise has been honest. This seems to be especially true in trying to evoke creative behavior among children. Even in administering tests, we noted that children would reduce their productivity or produce only very obvious and commonplace ideas, if we praised them. If we simply accepted and recorded their ideas, they seemed to increase their production of ideas and to produce ideas that are more original.

In earlier chapters, some of the major points of view concerning negative and positive evaluation in creative problem-solving have been discussed. Osborn (1957, 1963) and others have gone to great lengths to taboo negative evaluation or criticism in encouraging groups to think of new ideas. Clark (1958) has taken the same approach in training individuals to think creatively. Stein (1958) has maintained that an environment conducive to creativity must be free of hostility, criticism, and evaluation. Rogers (1953) has contended that external evaluation should be absent if creativity is to flourish. According to him, external evaluation is always a threat, elicits defensiveness, and results in denying the awareness of some area of experience.

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[1] I am indebted to Dr. Paul C. Rosenbloom of the Minnemath Center, University of Minnesota, for interesting me in the study of the evaluative thinking of mathematics teachers and for making available the data used in preparing this chapter.

Although the trend towards the abandnment of evaluation has at least shaken us out of the praise-blame, positive-negative, reward-punishment dichotomies, it too has been unsatisfying. These new concepts have not given teachers the practical guidance they require in stimulating thinking. Teachers simply cannot escape their evaluative roles; evaluation pervades almost all of their classroom behavior. Some researchers have pursued a more direct approach to the actual classroom teaching situation. McKeachie (1958), for example, on the basis of learning studies in college classes, argues that students will develop along whatever lines they are evaluated in determining their grades. He sees evaluation as a powerful force in stimulating learning and thinking. The accumulated evidence along this line tells teachers to model their evaluation procedures to harmonize with their objectives. If teachers want students to think creatively about course materials or to evaluate course materials in making decisions, they must construct tests and assessment devices which will evaluate these kinds of achievement. This still does not tell the teacher *how* to fulfill his evaluative role.

McDonald's (1959) concept of teaching as hypothesis-making and hypothesis-testing offers a possible escape from the dilemmas of negative versus positive evaluation, evaluation versus no evaluation, and the like. This would make the process of evaluation, as it is used to guide the learning and thinking processes, one of hypothesis-making and testing. McDonald sees the teacher as engaged in an uninterrupted cycle of evaluation, generating and testing hypotheses about more adequate procedures, always tentative in his conclusions.

In this chapter the author makes a groping attempt to analyze the nature of the evaluative behavior of mathematics teachers participating in the Minnesota National Laboratory for the Improvement of Secondary Mathematics under the direction of Professor Paul C. Rosenbloom. This excursion began when Professor Rosenbloom handed the author two sets of logs of teacher and pupil activities, each consisting of the reports of five seventh, eighth, and ninth grade mathematics teachers. One set of logs had been submitted by the five most effective teachers participating in the 1958-59 study, as determined by the regression coefficient of the post-test achievement scores of their pupils on the pre-test achievement and aptitude scores. The other set had been submitted by the five least effective teachers on this criterion. Without indicating which was the effective and which was the ineffective group, Rosenbloom challenged the author to devise some way of analyzing the thinking of these two groups of teachers in such a way as to differentiate between them. It seems appropriate to report this exploratory work as a study of the role of evaluation and creative thinking, since the experimental mathematics materials place a great deal of emphasis upon learning by discovery, creative thinking, etc. and since the analysis of the data came to focus upon the teacher's evaluative thinking.

The Minnesota National Laboratory

The Minnesota National Laboratory for the Improvement of Secondary Mathematics was established in 1958 to provide facilities for statewide testing of the mathematics materials to be produced by the National School Mathematics Study Group (SMSG, Newsletter No. 2, 1959). This Laboratory is part of the Division of Instruction in the Minnesota State Department of Education. During its first year, the laboratory conducted two experiments, one in the seventh and eighth grade and one in the ninth grade. Twenty-one teachers participated in the first and fifteen in the latter. In 1959-60 the experiment included a total of 127 teachers from grades six through twelve.

Both standard tests and tests devised by Rosenbloom and Edward O. Swanson have been used in evaluating achievement. Below the ninth grade, the School and College Ability Test (SCAT) were given as a measure of aptitude and in the ninth grade and above the Differential Aptitude Tests (DAT) were given. The Sequential Tests of Educational Progress (STEP) in Mathematics were given as a pre- and post-test in September and May respectively. The measure of effectiveness used in identifying the most and least effective teachers is the regression coefficient of the post-test achievement scores of their pupils on the pre-test achievement and aptitude scores.

Although it is not appropriate to detail here the ambitious and vigorous program of the School Mathematics Study Group and the Minnesota National Laboratory, information concerning their basic objectives are essential to an understanding of the analyses reported herein. These are interestingly set forth in the following statement from a mimeographed leaflet entitled "School Mathematics Study Group":

> "...The number of our citizens skilled in mathematics must be greatly increased; and understanding of the role of mathematics in our society is now prerequisite for intelligent citizenship. Since no one can predict with certainty his future profession, much less foretell which mathematics skill will be required in the future by a given profession, it is important that mathematics be so taught that students will be able in later life to learn the new mathematical skills which the future will surely demand of many of them."

Procedures

The data pertinent to this study are the daily logs submitted by teachers participating in the SMSG program during 1958-59 and 1959-60. Teachers were instructed to pick any two days during the first week. For the next week, they selected any two of the other three days of the week. They continued in this way throughout the term. They were asked to report teacher activities concerning the following:

1. Advance preparation
2. Introduction of present phase of work
3. Demonstrations
4. Questions raised by teacher
5. Explanations to class
6. Explanations to individuals
7. Independent time
8. Homework assigned
9. References assigned
10. Material studied by teacher
11. Suggestions
12. Evaluation of effectiveness of material, teaching, and learning.

They were also asked to consider the following aspects of pupil activity:

1. Group activities
2. Individual activities
3. Evidence of interest in non-assigned work
4. Class discussions
5. Incidents of discovery or non-discovery
6. Extra problem solving
7. Math club
8. Fair exhibit
9. Choice of courses for next year.

The logs were of a free-response type, some giving an excellent picture of the thinking activities of the teacher and his pupils and others revealing little information concerning this process.

First, an attempt was made to categorize the activities reported in 1958-59 according to Guilford's (1959) classification of mental operations: cognition, memory, convergent thinking, divergent thinking, and evaluation. Under cognition, we placed activities involving recognition, familiarity, awareness, knowledge about, appreciating, and the like. Memory included activities involving memorizing, remembering, recalling, knowing thoroughly, learning thoroughly, and the like. Under convergent thinking was included getting the correct answer, solving problems correctly, having the proper attitude, and the like. Under divergent thinking, we counted problem solving where there is no one correct or accepted best answer, independent thinking, constructive thinking, creative thinking, original work, questioning, inquiring, and the like. Evaluation included critical thinking, assessing, evaluating, judging, making decisions, comparing, and contrasting.

The logs analyzed according to this procedure were those submitted by the five most and five least effective teachers in the 1958-59 experiments, as identified by the regression coefficients already described. The analyses were completed without knowledge of the effectiveness classification of the teacher. Teacher and pupil activities were analyzed separately and compared by means of chi square.

Our definition of evaluative behavior was elaborated and reported activities reanalyzed to understand the differentiating characteristics of the evaluative thinking of these two groups of teachers. When the 1959-60 data became available they were similarly analyzed for evaluative thinking. Approximately ten per cent of the teachers at each grade level were chosen at each extreme. This gave fourteen in each group, slightly over ten per cent (1 in 6th, 4 in 7th, 2 in 8th, 1 in 9th, 2 in 10th, 2 in 11th, and 2 in 12th.)

Three categories of evaluative behavior were used: positive evaluation, negative evaluation, and trouble-shooting or hypotheses-making types of evaluation. The following are examples of each:

1. Negative evaluation
   "Class is too large and abilities too widespread."
   "They didn't get this lesson very well."
   "Students had some difficulty rounding off to desired figure."
   "Pupils showed inability to ferret out method by themselves."
   "Some students are becoming bewildered as they are confronted by these proofs."
   "These materials are very poor."
   "The wording caused trouble."
   "Morale is very low."

2. Positive evaluation
   "This material is excellent."
   "The pupils were enthusiastic and had fun."
   "I like these questions."
   "Presenting large numbers was very simple and none of the pupils had any difficulty."
   "Good response so far."
   "Many really shouted when they realized what ________ stood for, so it's good for something."
   "My top five students were real enthusiastic and helped to carry the class along."
   "These were easy to understand and teach."

3. Trouble-shooting: hypothesis-making and testing
   "The pupils are having a very difficult time with proofs. I think maybe they have a mental set against three-space ideas."
   "The students have, I think, in the backs of their minds the idea, why don't we do this the way we always have -- why make such a production out of this? My explanations satisfy but not always completely."
   "I had noticed some difficulty in the writing of congruence in problems such as one and eight in problem set 6-1. As a result of this observation, I made models of the square, isosceles triangle, and equilateral triangle...The problem of writing congruencies seemed to be much less once students had seen concrete examples."

> "Those who have a natural space visualization talent get along real well but for the others it requires some real hard work."
>
> "Students are gradually accustoming themselves to new notations; the old traditional ideas seem to still linger in their minds."
>
> "I believe the students learn better at this point if they present the proofs than if I do them."
>
> "Generally students respond well when information and conclusions are based on general discussion, assigned work, and relatively simple ideas. When ideas become more general or require assembling of other ideas to bring out the desired conclusions, then the student flounders."
>
> "This class seems very alert to everything in these units, probably because this is a change from the regular work they had last year."
>
> "My group seems much too 'grade-conscious,' to the extent that fear of making a mistake hampers their progress. The boys are more adventuresome then the girls and have a much more relaxed attitude. The girls are inclined to be tense and wary."
>
> "The exercise on page 4 might have worked out better as a blackboard discussion where the student might have 'discovered' the principle that Gauss used."

The basic criteria for assigning an activity to this category is that it must show that the teacher has identified a specific difficulty and has advanced some hypothesis concerning its cause or remedy, and/or has tested such an hypothesis.

Results

Mental Operations of Teachers and Pupils

A total of 142 logs of the most effective and 162 logs of the least effective were available for analysis, or an average of 28.4 and 32.4 per teacher respectively. The number and percentage of activities classified into each of the five types of mental operations reported by the five least and five most effective teachers in the 1958-59 experiment are presented in Table 18.1. It will be noted that the distribution of activities among the five types of mental operations for the two groups differs significantly. The more effective teachers tend to report proportionately fewer cognitive and memory activities and more of the "thinking" activities (convergent, divergent, and evaluative).

Table 18.1

Number and Percentage of Each of Five Types of Mental Operations Reported by Five Least and Five Most Effective Teachers in 1958-59 Experiments

Kind of Mental Operation	Most Effective Number	Most Effective Per Cent	Least Effective Number	Least Effective Per Cent
Cognitive	106	27.6	161	41.6
Memory	16	4.2	25	6.5
Convergent	76	19.8	50	12.9
Divergent	46	12.0	32	8.3
Evaluative	140	36.4	119	30.7
Total	384	100.0	387	100.0

NOTE: Chi square = 22.67, _df_ = 4; _p_ < .001

Table 18.2 includes a similar set of data for the pupils of the five least and five most effective teachers. Here it will be noted that proportionately more of the thinking and fewer of the cognitive activities are reported by the most effective teachers.

Table 18.2

Number and Percentage of Each of Five Types of Mental Operations of Pupils Reported by Five Least and Five Most Effective Teachers in 1958-59 Experiments

Kind of Mental Operation	Most Effective		Least Effective	
	Number	Per Cent	Number	Per Cent
Cognitive	29	10.8	128	33.9
Memory	23	8.5	35	9.3
Convergent	86	32.0	98	25.9
Divergent	98	36.4	78	20.6
Evaluative	33	12.3	39	10.3
Total	269	100.0	378	100.0

NOTE: Chi square = 51.56; _df_ = 4; _p_ <.001

Evaluative Thinking of 1958-59 Teachers

In classifying and tabulating the activities, the author became aware that the behavior classified as evaluative in one group was quite different from that classified as evaluative in the other group. It was then that he decided to reanalyze in greater depth the evaluative thinking of these teachers in an attempt to understand the sensed differences. The data presented in Table 18.3 summarize the results of this re-analysis.

Table 18.3

Number and Percentage of Each of Three Types of Evaluative Thinking Manifested by Five Most and Five Least Effective Teachers in 1958-59 Experiments

Type of Evaluative Thinking Shown	Most Effective		Least Effective	
	Number	Per Cent	Number	Per Cent
Negative evaluations; defects; etc.	25	10.3	59	22.0
Positive evaluation; not accompanied by reasons or hypothesis	64	26.4	129	48.1
Trouble-shooting evaluation; hypothesis-making, etc.	153	63.3	80	29.9
TOTAL	242	100.0	268	100.0

NOTE: Chi square = 57.23; _df_ = 2; _p_ <.001

It will be observed that in this analysis a larger number of activities were treated as evaluative thinking than in the original analysis. This is due primarily to the fact that some of the activities originally classified as "creative thinking" and placed under the divergent-thinking category were evaluative in nature. This shift occurred primarily in relation to hypotheses and the suggestion of possibilities for "improving" some aspect of the process.

It will be observed from Table 18.3 that the effective teachers reported far more of the trouble-shooting and hypothesis-making activities than did the least effective teachers. The less effective teachers tended to report proportionately more negative and positive evaluations than the more effective ones.

Evaluative Thinking of 1959-60 Teachers

The daily logs submitted by the 14 most and 14 least effective teachers in the 1959-60 experiments were analyzed in the same way as those of the five most and five least effective ones in the 1958-59 studies. A total of 607 logs for the most effective group and 616 for the least effective were available for analysis. Thus, we have a mean of 43.4 for the high group and one of 44.0 for the low group, considerably better returns than in 1958-59. The results of this analysis are presented in Table 18.4.

Table 18.4

Number and Percentage of Each of Three Types of Evaluative Thinking Manifested by Fourteen Most and Fourteen Least Effective Teachers in 1959-1960 Experiment

Type of Evaluative Thinking Shown	Most Effective		Least Effective	
	Number	Per Cent	Number	Per Cent
Negative evaluation; defects; etc.	142	9.6	198	13.6
Positive evaluation; not accompanied by reasons or hypothesis	360	24.3	573	39.3
Trouble-shooting evaluation; hypothesis-making; etc.	981	66.1	688	47.1
TOTAL	1483	100.0	1459	100.0

NOTE: Chi square = 108.85; df = 2; p < .001

It will be noted that the results are essentially the same as for the 1958-59 analysis. Among the least effective teachers, however, there was a proportionate increase in the trouble-shooting or hypothesis-making activities with an accompanying decrease in negative and positive evaluations.

A closer examination of the activities classified as trouble-shooting or hypothesis-making in the two groups provided several clues for refining the system for analyzing evaluative thinking. Among the least effective teachers, there seems to be a far greater tendency than among the most effective ones to report hypotheses which are so general as to be of little value. The two outstanding favorites of this group of teachers are:

"They have difficulty with ______ because they can't read."
"The bright ones had no difficulty, but the slow ones found it quite difficult."

These teachers also seemed to depend rather heavily upon tests to do their trouble-shooting diagnoses in a mechanical sort of way. There also seemed to be a characteristic tendency among this low group to report their hypotheses as conclusions or as hypotheses already tested rather than in the hypothesis-making form.

Of especial interest are the logs of two teachers who were among the most effective in 1958-59 and among the least effective in 1959-60. Both are classified as among the best qualified teachers in the experiment. Most strikingly different are the logs of Teacher A who, in 1958-59, submitted 42 logs with a total of 83 activities which could be classified as evaluative behavior, and in 1959-60 returned 66 logs reporting only 25 activities which could be classified as evaluative. In 1958-59, her logs reflected keen sensitivity to the difficulties of her pupils and a wealth of ideas about their nature and treatment. Her 1959-60 logs reflect none of this alertness. The pattern of evaluative thinking is also different. In 1958-59, 17 per cent of her evaluative responses were positive; 11 per cent, negative; and 72 per cent, trouble-shooting or hypothesis-making. In 1959-60, 64 per cent were positive; 20 per cent, negative; and 16 per cent, trouble-shooting or hypothesis-making. In other words, the pattern of Teacher A's evaluative thinking was typical of her effectiveness category.

Teacher B presents a somewhat different problem. His pattern of evaluative thinking is fairly consistent. In 1958-59, his evaluative thinking was scored as 63 per cent positive, 4 per cent negative, and 33 per cent trouble-shooting or hypothesis-making. In 1959-60, the percentages were 41, 7, and 52 respectively. His logs for both years reflect such enthusiasm and energy that one would expect at first glance that he would be an effective teacher. His logs are characterized by extremely positive evaluations and if we were to rely only upon the net gains of his pupils, he would again be among the most effective teachers. Nevertheless, one might suspect that he is himself so creative and energetic that he gives his pupils little opportunity to learn creatively, and that his set for positive evaluation is so strong that he may be unaware of the difficulties which his pupils are experiencing. In 1959-60, there is also a recurrent note of pressure to "cover material" and a lack of time for pupils to discover, solve problems, and think.

Discussion

The major function of the chapter has been to set forth the development of the author's experiences in trying to discover clues concerning the kind of thinking which differentiates the performance of the most and least effective teachers in experimental courses involving creative thinking. In spite of the many defects in the data, however, it seems rather clear to the author that the most effective teachers do more thinking than the least effective ones and that their evaluative thinking is characterized by the trouble-shooting or hypothesis-making kind of evaluation rather than positive or negative evaluations. Since one of the objectives of the experimental courses is to teach mathematics in such a way that students will be able in later life to learn the new mathematical skills which will be demanded, such a finding appears to be especially salient.

The author has no desire, however, to delude the reader concerning the scientific rigor of the study. There are many defects in the data. Some teachers submitted logs for two days each week for every week in the school term, while one teacher in 1958-59 submitted only six logs. Some logs supplied data which were easy to analyze, while some like those of Teacher A in 1959-60 supplied very little data which can be analyzed. Thus, categorized activities rather than teachers have been chosen as the unit for analysis. Logs might also have been chosen.

Evaluation of pupil achievement in terms of the objectives of the SMSG program also poses difficulties, not only in determining teacher effectiveness, but in the operation of the experimental program. Although Professors Rosenbloom and Swanson are developing such tests, much importance is being attached to the results of traditional standardized instruments such as the STEP tests. Many of these difficulties are reflected in the following account of a trouble-shooting activity of one of the more effective teachers in the 1958-59 study:

> "I had to use one class period to pep talk students because they were worrying about taking an achievement test in May on the regular fundamentals. Some of the girls were worked up to the point of crying because the test is largely traditional material, much of which they will not have had. Most of them scored above grade level last year and they are afraid of the comparison this year. They have been assured that the fact that they have not had this material will be taken into consideration, but they were still worried. I think that I convinced them that this course has increased their perception to the extent that they will be able to figure out many things that they haven't had, partly because they are no longer bewildered by something very different and are more aggressive and ready to tackle something new without as much fear of making a mistake. Without this course they might not even try to solve something unfamiliar, such as the area of a circle or the simple interest formula."

Professor Rosenbloom has discussed the need for appropriate measuring instruments in SMSG Newsletter No. 2 issued in June 1959. The development of such instruments requires new concepts and time. Thus, it is almost unavoidable that the assessment procedures which must be used during the initial stages of experiments such as these are anachronistic. This will be remedied only by time, hard work, and test-making ingenuity.

Summary

The data analyzed in the study described herein are the daily logs of teachers participating in the 1958-59 and 1959-60 SMSG experiments under the direction of the Minnesota National Laboratory for the Improvement of Secondary Mathematics. Teacher effectiveness was determined from the regression coefficients of post-test achievement scores of pupils on pre-test achievement and aptitude scores. Thirty-six teachers of seventh, eighth, and ninth grade mathematics participated in the 1958-59 experiments and 127 from sixth through twelfth grade took part in the 1959-60 experiments.

First, the daily logs of the five most and five least effective teachers in the 1958-59 experiments were analyzed in an attempt to determine the types of mental operations represented by the teacher and pupil activities reported. Guilford's mental operations (cognition, memory, convergent thinking, divergent thinking, and evaluation) were adopted for this purpose. The analyses indicated that the distribution of activities among the mental operation categories for the two groups differed significantly. The more effective teachers tended to report more thinking activities (convergent, divergent, and evaluative) than the less effective ones who reported proportionately more recognitive and memory activities.

A new scheme was then devised for analyzing the evaluative behavior of these teachers as reflected in their logs. The categories used were: negative evaluation, positive evaluation, and trouble-shooting, or hypothesis-making and hypothesis-testing evaluation. The more effective teachers were found to report far more of the trouble-shooting or hypothesis-making type of activity whereas the less effective ones reported more negative and positive evaluation. The logs of the 14 most and 14 least effective teachers in the 1959-60 experiments were analyzed according to the same procedure with essentially the same results. Detailed examination of the hypothesis-making behavior of these two groups, indicates that the thinking represented by the hypothesis-making behavior of the less effective teachers tends to be too general, stereotyped, and vague to be of real value. They also tend to report conclusions or hypotheses as having been tested rather than actual hypotheses about the reasons for difficulties and possibilities concerning their solution. It was also suggested that teachers whose evaluations are predominantly positive may actually be unaware of the difficulties their pupils are having in learning. They may perform so creatively themselves that they give their pupils no opportunity to learn creatively.

New reporting forms and procedures were devised in an attempt to collect a more adequate set of data in the future studies, to assess the effects of the experimental SMSG materials, and to provide information concerning the characteristics of the evaluative thinking of effective teachers.

Chapter 19[1]

HOW DIFFERENT CULTURES EVALUATE CREATIVE CHARACTERISTICS

Perhaps one of the most powerful ways in which a culture encourages or discourages creative behavior is the way by which teachers and parents encourage or discourage, reward or punish, certain personality characteristics as they develop in children -- or the behaviors which manifest those characteristics. Usually this encouraging and discouraging process is accomplished in terms of what parents and teachers regard as ideal behavior or in terms of the kind of person they would like to see children become. For this reason, I believe that it is tremendously important that we find out what teachers and parents in various cultures consider an ideal personality. Thus, we started asking parents and teachers what kind of persons they would like for their children or pupils to become.

From the very outset of this inquiry, we expected to find within each culture some values which encourage creativity and some which discourage it. We also expected to find differences and similarities both within and among different cultures. We believed, however, that it would be useful if we could identify those values in a culture which encourage or discourage creative development and if we could identify the similarities and differences both within and among cultures. It is the purpose of the study described in this chapter to contribute to this goal. Although this exploration has for some time been quite out of hand and will require volumes to report, this chapter will be concerned with only five cultures or subcultures, one each in the United States, Germany, India, Greece, and the Philippines.

Procedures

The Ideal Pupil Checklist

The Ideal Pupil Checklist, the basic instrument used in this study, consists of 62 characteristics, 60 of which have been found through empirical studies to differentiate some group of highly creative people from a similar group of less creative people. In developing this instrument we were able to draw from over 50 such empirical studies. In all of these studies, persons identified as being highly creative on some acknowledged criterion of creative behavior were contrasted with comparable individuals on personality measures derived from traditional tests such as the Thematic Apperception Test, the Minnesota Multiphasic Personality Inventory, the Rorschach and others. The first checklist derived from a survey of these studies consisted of 84 characteristics, some of which were overlapping. The list was then pared down to 60 characteristics and then "healthy" and "physically strong" were added for reference purposes.

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The characteristics included in the checklist are listed in Table 19.1. The following instructions were given to subjects in their own language (English, German, Greek, Gujrati, etc.):

> "Check each of the characteristics listed on this page which would describe the kind of person you would like to see the children you teach become. Double check the five characteristics which you consider most important and believe should be especially encouraged. Draw a line through the characteristics which you consider undesirable and which should be discouraged or punished."

This procedure has the very desirable advantage of being easy to administer within a very short period of time under individual or group testing conditions. Two alternative procedures have been adopted since this study was conducted, one procedure permitting an unlimited number of double checks but otherwise identical to that described above and the other involving Stephenson's Q-sort method which requires the subject to rate characteristics according to a forced distribution. For the purpose of obtaining a group picture of what characteristics are most negatively and positively evaluated, however, it is believed that the procedure used in the present study is satisfactory. Admittedly the instrument is a "coarse-grained" one but it probably yields about as much precision as is feasible for the purposes of this study.

The Creative Personality Q-Sort

In order to obtain at least a tentative standard against which sets of group ratings can be compared on Expert Creative Personality Q-Sort was compiled. The 62 statements in the Ideal Pupil Checklist were transformed into a Q-sort and rated by a panel of 10 judges, all of whom had had advanced graduate courses in personality theory and all of whom have been serious students of the creative personality for at least one year. The judges were given the following instructions:

> "Use the 62 statements on this set of cards to describe your concept of the 'ideal' creative personality. At the high end of the scale you should place those characteristics which you regard as most important in the making of a productive creative person. At the low end of the scale you should place those characteristics which you consider least important in the making of a creative personality or which might actually be a liability.

Please follow the following procedure in making your ratings:

(1) Pick out the characteristic which you consider most important in the making of a productive, creative personality and place the card bearing this characteristic in the pile marked "1."

(2) Pick out the three characteristics which are the next most important and place the cards bearing these characteristics in the pile marked "2."

(3) Pick out the next five most important characteristics of what you consider the ideal creative personality and place them in pile "3"; the next nine most important characteristics in pile "4"; and the next 13 most important ones in pile "5."

(4) From the remaining 31 characteristics, pick out the one which you consider least important in the making of the ideal creative personality or one which might actually be a liability and place it in the pile numbered "10."

(5) Place the cards bearing the three next least important characteristics in the pile numbered "9," the next five in the pile numbered "8," the next nine in the pile numbered "7" and the remaining 13 in the pile numbered "6."

The ratings of the ten experts were combined and converted into a composite Q-sort by adding the ratings received by each item, ranking the items on the basis of these values, and then placing them into the original Q-sort distribution (1, 3, 5, 9, 13, 13, 9, 5, 3, 1).

Subjects

The subjects were teachers and other educators from five rather distinct cultural groups, tested in their own countries in their own native languages. The United States sample consisted of 264 educators in the Buffalo, New York, area. The checklist was administered at a meeting sponsored by the Creative Education Foundation and addressed by Drs. J. P. Guilford of the University of Southern California and E. Paul Torrance, of the University of Minnesota. School systems in the northwestern part of the state of New York were invited to send representatives to this session but additional tickets were supplied some school systems requesting them. Although this group may have been somewhat more selected and somewhat better oriented to a creative type of education than other groups tested in the United States, there are reasons to believe that it is fairly representative of United States teachers. The composite rankings of this sample correlated .95 with the composite rankings of a sample of 583 teachers which included groups in the states of Wisconsin, Minnesota, Illinois, Michigan, California, Georgia, Florida, Nebraska, and Mississippi. The correlations among these several subsamples were all .93 or higher. Thus, we seem to be obtaining a measure which possesses a great deal of cultural commonality.

The German sample consisted of 94 elementary and secondary teachers in Berlin. The checklist was translated into German by Dr. Dietmar Schenitzski, a native of Germany who has lived in the United States for several years, and Mr. Wolfgang Koeplin, who administered the checklist. The responses obtained lead us to believe that a few of the rankings may be peculiar to the Berlin sample. Most of the rankings, however, appear to be consistent with what are generally considered to be the cultural values of Germany.

The sample from India consists of 375 elementary and secondary teachers in the Baroda area. The checklist was translated into Gujrati and administered by Dr. Pramila Phatak of the faculty of Department of Educational Psychology of Baroda University. Subjects were presented with a checklist which included both the English and Gujrati equivalents, since many of the subjects were quite fluent in English. Baroda is a princely state and was formerly a part of the state of Bombay. It was one of the first states of India to introduce compulsory education. Gujrati is the official language of the state but many of the people speak Marathi. Baroda University is the leading educational center of this rather progressive state and there is a considerable amount of educational experimentation underway.

The Greek sample consisted of 94 teachers in the area around the city of Volos, coming from such villages, towns, and cities as; Gomme, Zagora, Safades, Argalaste, Larissa, Tricala, Elasson, Tsaugarada, Sciathos, Velestinan, Calabaca, and Pharsala. The checklist was translated into Greek by Mr. John Karoussos, a former student and advisee of the author and a native of Greece. Subjects were presented a checklist containing both the English and Greek words. The teachers included represent a variety of academic disciplines, grade levels, and localities.

The Philippine sample consisted of 147 teachers enrolled either in the Philippines UNESCO National Training Center or the Philippines National Community Training Center. As all of the subjects knew English, the checklist was presented in English and administered by Dr. Bonifacio Pilapil, at that time Dean of the Graduate School involved in this UNESCO Center.

Analysis of Data

For each of the five cultural groups, an index was obtained for each of the 62 checklist characteristics by weighting responses as follows: 2 points for a double check, 1 point for a single check; 0 for no check nor strikethrough, and minus 1 for each strikethrough. On the basis of these indexes, each characteristic was then ranked from 1 (most desirable) to 62 (least desirable) for each of the five groups.

In order to measure each set of rankings against the expert ratings for the Ideal Creative Personality, each set of ratings was transformed into the Q-sort distribution and then correlated with the expert ratings by standard Q-sort procedures.

In order to explore the differences within cultures and to examine the different factors which emerge from the checklist, a separate factor analysis was conducted with each of the five sets of checklists. The factor analyses were conducted according to the University of Minnesota Numerical Analysis Center UMSTAT55 program. The factor loadings selected were the varimax loadings (Cooley and Lohnes, 1962; Harmon, 1960). The varimax solution tends to restrict the number of variables with high loadings within a given factor. (This contrasts with the quartimax system which tends to restrict high loadings for a given variable to a few factors.) The Kaiser criterion was used to indicate the number of noteworthy factors as well as the maximum number of factors.

Results

Table 19.1 contains a summary of the composite rankings by the five cultural groups for each of the 62 items. Numerous similarities

Table 19.1

Summary of Composite Rankings by Five Different Cultural Groups of Characteristics Contained in Ideal Pupil Checklist

Characteristic	Composite Rankings				
	Buffalo, N.Y. (N=264)	Germany (N=93)	India (N=375)	Greece (N=94)	Philippines (N=147)
Adventurous	19	10.5	25	52.5	24.5
Affectionate	40	46	9	18.5	10
Altruistic	36	22	23	8	44
Always asking questions	38.5	30	43	27	37
Attempts difficult tasks	18	5	15	20.5	22
A self-starter	8	14.5	7	30	28
A good guesser	50	45	34	34	54
Bashful	57	53	54	47	59
Becomes preoccupied with tasks	41	12	26	57	43
Considerate of others	4	16	35	13	5
Critical of others	52	29	49	42	46
Courageous in convictions	15	25.5	17	38	15
Courteous	13	18.5	4	10.5	3
Curious	2	7	1	18.5	18.5
Competitive	31	18.5	37	23	32
Desires to excel	24.5	55	11	35	36
Determination	7	27.5	10	14.5	21
Domineering	61	58	50	59	55
Disturbs class organisation and procedures	59	62	62	58	60.5

Table 19.1: continued

Characteristic	Composite Rankings Buffalo, N.Y. (N=264)	Germany (N=93)	India (N=375)	Greece (N=94)	Philippines (N=147)
Does work on time	22	10.5	3	12	6
Emotional	54	51	38	23	40.5
Emotionally sensitive	42	42	48	55	51
Energetic	16	31	13	1	11
Fault-finding	58	61	61	52.5	57
Haughty and Self-satisfied	52	59	52	62	49
Healthy	14	8.5	5.5	7	4
Independent in judgment	20	6	27	17	23
Independent in thinking	1	4	16	32	18.5
Intuitive	32	37	33	39	42
Industrious	5	3	8	14.5	1
Likes to work alone	43	36	46	23	31
Never bored	34	32	19.5	48	30
Non-conforming	48	34.5	55	4.5	53
Negativistic	60	55	57	61	56
Obedient	30	24	2	10.5	2
Popular, well liked by peers	27	20	28	20.5	27
Persistent	12	23	22	40.5	38.5
Prefers complex tasks	37	38	39	27	38.5
Physically strong	38.5	39	30	36.5	12.5
Quiet	47	34.5	29	25	17
Receptive to ideas of others	6	25.5	44	36.5	26
Regresses occasionally	49	52	50	46	47
Reserved	46	44	47	43.5	33
Remembers well	24.5	13	14	6	8
Self-confident	11	8.5	5.5	9	7
Self-assertive	44	33	45	30	40.5
Self-sufficient	35	42	42	43.5	24.5
Sense of humor	3	2	31	46	14
Sense of beauty	23	27.5	36	16	12.5
Sincere	9	1	18	4.5	20
Spirited in disagreement	45	42	56	40.5	45
Strives for distant goals	21	49	19.5	2	16
Stubborn	55.5	57	58	50	62
Sophisticated	53	50	12	54	59
Timid	55.5	54	53	60	58

Table 19.1: continued

Characteristic	Composite Rankings Buffalo, N.Y. (N=264)	Germany (N=93)	India (N=375)	Greece (N=94)	Philippines (N=147)
Thorough	10	14.5	21	3	35
Talkative	51	60	60	33	60.5
Unwilling to accept anything on mere say-so	33	47	41	49	52
Visionary	26	48	51	51	48
Versatility	17	17	24	27	34
Willing to take risks	28.5	21	40	45	29
Willing to accept judgments of authorities	28.5	40	32	30	9

and differences are noted in these rankings. Some of the major cultural values become apparent when we examine the following list of the ten most valued characteristics of each group:

United States	Germany	India	Greece	Philippines
Independent in thinking	Sincere	Curious	Energetic	Industrious
Curious	Sense of humor	Obedient	Strives for distant goals	Obedient
Sense of humor	Industrious	Does work on time	Thorough	Courteous
Considerate of others	Independent in thinking	Courteous	Sincere	Healthy
Industrious	Attempts difficult tasks	Healthy	Non-conforming	Considerate of others
Receptive to others' ideas	Independent in judgment	Self-confident	Remembers well	Does work on time
Determination	Curious	A self-starter	Healthy	Self-confident
Self-starter	Self-confident	Industrious	Altruistic	Remembers well
Sincere	Healthy	Affectionate	Self-confident	Willing to accept judgments of authorities
Thorough	Adventurous	Determination	Courteous	Affectionate

Even as we examine this list of the ten most favored characteristics of each of the five groups, we begin forming an impression of the cultural values which encourage and discourage creative behavior. Missing from all except the United States and German list are such characteristics as "independence of thinking" and "independence of judgment." "Curiosity" ranks high in the Baroda, India, group but does not enter the top ten characteristics of the Greek and Philippine teachers. In the Indian list, however, curiosity is followed immediately by "obedient," "does work on time," and "courteous." "Remembers well" appears in both the Greek and Philippine lists but not in any of the others.

We obtain a better index of the extent to which the values of each culture conforms to creative values as measured by the expert sorts of the Creative Personality when we examine the coefficients of correlation between the composite ratings of each culture with the expert sort. These data are shown in Table 19.2. It will be noted that all of the coefficients of correlation are relatively low, indicating that according to expert judgment all five of the cultures contain values which are inimical to creative development and behavior. The United States and German groups would appear to have less than the other three groups, however, with India, Greece, and the Philippines following in that order.

Table 19.2

Coefficients of Correlation Between Composite Group Ratings of Five Different Cutlural Groups with Composite Q-Sort Ratings of Experts on Creative Personality

Cultural Groups (Teachers)	Number	Coefficient of Correlation
Buffalo, New York, USA	264	.51
Berlin, Germany	93	.47
Baroda, India	375	.35
Volos, Greece	94	.32
Manila, Philippines	147	.30

Correlations were also run for the composite ratings of the larger sample of 583 United States teachers and for a sample of 257 parents in the Twin Cities area against the expert sort for the Creative Personality. In both cases, coefficients of correlation of .42 were obtained. This is especially interesting since the ratings of the Buffalo group correlated .95 with those of the diverse group from nine different states. A closer examination of the data indicate, however, that the ratings of the more diverse group do differ from the Buffalo group's ratings on crucial items, such as a greater emphasis on "being considerate of others," "doing one's work on time," "being courteous," and "obedient" and less emphasis on "courage," "criticism," "curiosity," "emotionality," "sensitivity," and "independence of thought."

The data contained in Table 19.3 are designed to highlight the specific characteristics which, according to the expert sort on the creative personality, may be encouraged or discouraged more than might be desirable in the interest of the development of creative personalities. It will be noted that some of the overemphases are common to all or almost all of the cultures, while others are peculiar to one or two of the cultures. All five cultures, according to this standard, may be unduly punishing the good guesser, the child who is courageous

Table 19.3

Characteristics More Strongly Approved or Disapproved by Five Different Cultures (by Two or More Standard Deviations) Than Indicated by Expert Ratings of Ideal Creative Personality

Characteristic	Buffalo, N.Y.	Germany	India	Greece	Philippines
Adventurous (4)	-----	-----	-----	Disc.	-----
Affectionate (6)	-----	-----	Encour.	-----	Encour.
Altruistic (7)	-----	Encour.	Encour.	Encour.	-----
Always asking questions (4)	Disc.	-----	Disc.	-----	Disc.
Attempts difficult (4)	-----	-----	-----	-----	-----
A self starter (4)	-----	-----	-----	-----	-----
A good guesser (5)	Disc.	Disc.	Disc.	Disc.	Disc.
Bashful (7)	-----	-----	-----	-----	-----
Becomes pre-occupied (3)	Disc.	-----	Disc.	Disc.	Disc.
Considerate of others (6)	Encour.	Encour.	-----	Encour.	Encour.
Critical of others (5)	-----	-----	-----	-----	-----
Courageous (1)	Disc.	Disc.	Disc.	Disc.	Disc.
Courteous (8)	Encour.	Encour.	Encour.	Encour.	Encour.
Curious (2)	-----	-----	-----	Disc.	Disc.
Competitive (6)	-----	-----	-----	-----	-----
Desires to excel (6)	-----	Disc.	Encour.	-----	-----
Determination (4)	-----	-----	-----	-----	-----
Domineering (7)	-----	-----	-----	Disc.	-----
Disturbes organization (6)	Disc.	Disc.	Disc.	Disc.	Disc.
Does work on time (8)	Encour.	Encour.	Encour.	Encour	Encour.
Emotional (6)	Disc.	-----	-----	-----	-----
Emotionally sensitive (4)	Disc.	Disc.	Disc.	Disc.	Disc.
Energetic (5)	-----	-----	-----	Encour.	-----
Fault-finding (6)	Disc.	Disc.	Disc.	-----	Disc.
Haughty, self-satisfied (9)	Disc.	-----	-----	Disc.	-----
Healthy (6)	Encour.	Encour.	Encour.	Encour.	Encour.
Independent judgment (2)	Disc.	-----	Disc.	Disc.	Disc.
Independent thinking (2)	-----	-----	Disc.	Disc.	Disc.
Intuitive (3)	Disc.	Disc.	Disc.	Disc.	Disc.
Industrious (5)	Encour.	Encour.	Encour.	-----	Encour.
Likes to work alone (5)	-----	-----	-----	-----	-----
Never bored (6)	-----	-----	-----	Disc.	Disc.

Table 19.3: continued

Characteristic	Buffalo, N.Y.	Germany	India	Greece	Philippines
Non-conforming (5)	-----	-----	Disc.	Encour.	-----
Negativistic (7)	Disc.	-----	-----	Disc.	-----
Obedient (8)	Encour.	Encour.	Encour.	Encour.	Encour.
Popular, well-liked (7)	Encour.	Encour.	Encour.	Encour.	Encour.
Persistent (4)	-----	Disc.	Disc.	Disc.	Disc.
Prefers complex tasks (5)	-----	-----	-----	-----	-----
Physically strong (7)	-----	-----	Encour.	-----	Encour.
Quiet (7)	-----	-----	Encour.	Encour.	Encour.
Receptive to others' ideas (6)	Encour.	-----	-----	-----	-----
Regresses occasionally (5)	Disc.	Disc.	Disc.	Disc.	Disc.
Reserved (8)	-----	-----	-----	-----	-----
Remembers well (5)	-----	-----	-----	Encour.	Encour.
Self-confident (4)	-----	-----	-----	-----	-----
Self-assertive (4)	-----	-----	-----	-----	-----
Self-sufficient (5)	-----	-----	-----	-----	-----
Sense of humor (5)	Encour.	Encour.	-----	Encour.	-----
Sense of beauty (5)	-----	-----	-----	-----	-----
Sincere (5)	Encour.	Encour.	-----	Encour.	-----
Spirited in disagreement (6)	-----	-----	Disc.	-----	-----
Strives for distant goals (4)	-----	Disc.	-----	Encour.	-----
Stubborn (8)	Disc.	Disc.	Disc.	-----	Disc.
Sophisticated (9)	-----	-----	-----	-----	-----
Timid (9)	-----	-----	-----	-----	-----
Thorough (5)	-----	-----	-----	Encour.	-----
Talkative (7)	-----	Disc.	Disc.	-----	Disc.
Unwilling to accept say-so (3)	Disc.	Disc.	Disc.	Disc.	Disc.
Visionary (3)	Disc.	Disc.	Disc.	Disc.	Disc.
Versatility, well-roundedness (6)	Encour.	Encour.	-----	-----	-----
Willing to take risks (3)	Disc.	Disc.	Disc.	Disc.	Disc.
Willing to accept judgments of authorities (10)	Encour.	Encour.	Encour.	Encour.	Encour.

NOTE: Number in parentheses indicates composite Q-sort rating of experts in his convictions, the emotionally sensitive individual, the intuitive thinker, the individual who regresses occasionally and plays or acts childlike, the visionary individual, and the person who is unwilling to accept something on mere say-so without evidence. On the other hand, all of them may be giving unduly great rewards for being courteous, doing work on time, being obedient, being popular and well-liked, and being willing to accept the judgments of authorities.

It is interesting to note that the United States teachers alone are rated as unduly discouraging strong emotional feelings and unduly encouraging being receptive to the ideas of others. They stand together with Germany and Greece on giving a great deal of encouragement to sense of humor and with Germany on encouraging versatility and well-roundedness. They also stand alone with Germany in giving an appropriate degree of emphasis to "independence in thinking" and together with Greece in giving emphasis to "talkativeness."

The factor analysis data help to identify the ways in which cultures differ within themselves. Fourteen to 22 factors were extracted for each of the five groups studied, but it is believed that the first few factors identify the areas in which greatest differences occur within the culture. Thus, the loadings for only the first four factors are presented in Table 19.4.

Table 19.4

Varimax Factor Loadings for Four Primary Factors in Each of Five Different Cultures

Culture	Factor I		Factor II		Factor III		Factor IV	
Buffalo, USA	Fault-finding	.754	Reserved	.739	Regresses occasionally	.702	Popular	.442
	Domineering	.771	Quiet	.684	Sense of humor	.662	Guesser	.499
	Stubborn	.777	Courteous	.498	Emotional	.406	Self-confident	.442
	Timid	.741	Obedient	.413				
	Disturbing	.709						
	Negativistic	.673						
	Haughty	.660						
	Sophisticated	.651						
	Bashful	.496						
Berlin, Germany	Industrious	.764	Attempts difficult	.801	Altruistic	-.792	Courteous	-.770
	Never bored	.858	Indep. thinking	.578	Becomes preoccupied	-.685	Desires to excel	-.605
	Obedient	.877	Non-conforming	.426				
	Popular	.746	Receptive to ideas	.488				
	Complexity	.772						
	Strength	.792						
	Quiet	.897						
	Reserved	.823						
	Memory	.728						
	Self-confid.	.733						
	Self-assert.	.740						
	Self-suff.	.742						

Table 19.4; continued

Culture	Factor I		Factor II		Factor III		Factor IV	
	Humor	.707						
	Beauty	.801						
	Sincere	.742						
	Sophisticated	.792						
	Thorough	.703						
	Visionary	.735						
	Versatile	.734						
	Authority acc.	.736						
Baroda, India	Adventurous	-.518	Emotional	.547	Questioning	.466	Haughty	.832
	Courageous	-.401	Sensitive	.547	Popular	.405		
	Independent thinking	-.438	Self-assertive	.740	Complexity	.435		
	Intuitive	-.781			Receptive	.441		
	Persistent	-.526			Authority accept.	.847		
	Self-suffic.	-.734						
	Strives for dist. goals	-.679						
Volos, Greece	Independent judgment	.706	Determination	.407	Attempts difficult	-.408	Affectionate	-.464
	Independent thinking	.706	Strength	.573	Industrious	-.798	Guesser	.401
	Persistent	.431	Self-assert.	.787	Willing to risk	-.648	Curious	.661
	Visionary	-.441	Sincere	-.511				
			Talkative	.538				
Philippines	Attempts difficult	.688	Non-conforming	.509	Altruistic	.636	Guesser	-.402
	Self-starter	.655	Stubborn	.785	Desires to excel	.697	Reserved	.520
	Indep. judg.	.710	Timid	.445	Persistent	.795	Visionary	.457
	Indep. think.	.600	Talkative	.809	Receptive	.549	Willing to risk	.731
	Popular	.488			Regresses	.517		
	Receptive	.415			Beauty	.627		
	Self-confid.	.574			Visionary	.402		
					Versatile	.595		

NOTE: Only loadings = .400 are reported here

Factor I extracted from the Buffalo data represents a collection of characteristics which are generally disapproved and are highly correlated with one another. Factor I may be regarded as describing the United States teachers' concept of the misbehaving or troublesome child while Factor II characterizes their concept of the well-behaved, easy-to-teach child. Factor III would characterize the expressive, fun-loving child and Factor IV the socially well-adjusted and confident child. Factor I extracted from the German data probably represents rather central values of the culture. Several other characteristics not listed loaded on this factor, making Factor I explain a really large share of the variance within the German group. Factor II in the German data brings together an interesting combination of independence and non-conformity with openness and receptivity. It will be noted that Factor I in the India data is made up of characteristics which are not highly approved by the culture. The same people encourage or discourage "adventurousness," "courage," "independent thinking and judgment," "intuition," "peristence," "self-sufficiency," and "striving for distant goals." The traditionalist may differ in this respect from the more adventurous and progressive teachers now being produced by Baroda University and the emerging industrial community. Factor I in the Greek data would appear for the most part to reflect traditional Greek values, apparently still held by many Greek teachers, but not by others. Independence of thought and judgment are the most dominant characteristics making up this factor. Factor I in the Philippine data, however, probably reflects the new values imported by the UNESCO project and some of the more progressive educators and stand in contrast to the values of the more conservative and traditional Philippine teachers.

Discussion

On the basis of the data which have been presented in this chapter there are a couple of important conclusions about which we can feel rather certain and many about which we can speculate. The data certainly support the conclusion that, insofar as creative values are concerned, all five of the cultures have some features which support creative behavior, while others have questionable value and others are outright detrimental. The specific data provide hypotheses about the ways by which each culture might more adequately serve the needs of the creative person and encourage more creative kinds of behavior.

It is interesting to note that the coefficients of correlation of the values of the five cultures with the values of the experts on the creative personality agree rather well with some of the other comparisons which have been made of the creativity of various modern cultures. It will be recalled that the United States and Germany lead with India, Greece, and the Philippines lagging some distance away. Benjamin Bloom (1958) has discussed at length some of the factors in the culture of India which work against creative achievement and has given some interesting comparative statistics on a number of criteria. For example, he points out that in the period from 1901 to 1955 in the fields of physics, chemistry, physiology, and medicine, the number of Nobel Prize winners by country are as follows: Germany 41, United States 40, United Kingdom 32, France 13, India 1, and Japan 1. None were from Greece or the Philippines. He also cites observations concerning the various kinds of performance of graduate students in United States universities, interviews with Indian "intellectuals" and educational leaders, records of inventions, and the like. Nicom and others have identified a number of factors in the culture of India which work against creative achievement. These and other considerations will be examined in some detail in another report of creative development in India (Torrance and Prakash, in preparation).

Needless to say, the data which have been presented in this chapter possess a number of limitations which should be considered in interpreting the findings. No argument is made for the representativeness of the sample. Our experience indicates, however, that samples as large as the ones which have been used in this study seem to be rather representative of the larger cultures from which they are drawn. For example, correlations among several samples from quite scattered parts of the United States range from .93 to .97 and the Buffalo sample used in this study correlated .95 with a composite sample containing teachers from nine different states. Also, the Baroda sample used herein correlated .86 with the ratings of a group of teachers in New Delhi, India. Unfortunately, we do not have similar data for Germany, Greece, and the Philippines. We can, however, compare the data from this study with other things which we know about the cultural values of these countries.

Summary

On the basis of empirical studies of the personalities of creative persons, a checklist of characteristics important in the creative personality was compiled. This checklist was administered to groups in the general areas of Buffalo, New York, USA; Berlin, Germany; Volos, Greece; Baroda, India; and the Philippines. Rankings were obtained on each of the 62 characteristics comprising the checklist for each of these five cultural groups. These rankings were converted to the standard Q-sort distribution and compared with the Q-sort distribution derived from the ratings of a panel of experts on the creative personality. The data for each of the five cultural groups were also factor analyzed to reveal differences with each culture. It was found that the values of the United States and German samples correlate more closely with the ideal creative personality as judged by the panel of experts than the other three cultures. India comes next with Greece and the Philippines lagging. It is clear that all five cultures have some values which support creative behavior and others which are inimical to creative behavior. Specific under- and over-emphases were identified for each of the five groups.

Chapter 20[1]

HOW CHILDREN PERCEIVE THE CULTURE'S EVALUATION OF DIVERGENCY

In recent years cross-cultural or anthropological studies of child development have added a great deal to our understanding of personality development and functioning (Whiting and Child, 1953; Mead and Wolfenstein, 1955; Whiting, 1963). It is quite clear from these investigations that cultures differ in the kinds of childhood behavior they encourage and discourage. In other words, they evaluate differently various kinds of behavior, personality characteristics, mental functioning, and the like. There has been a meager beginning of studies to determine how these differences in the way cultures evaluate certain kinds of behavior affects the style of thinking of persons in different cultures (Eurich, 1962). In the study described in this chapter, the concern is with the differences in the ways preadolescent children in seven different cultural groups perceive the culture's evaluation and handling of divergent behavior or characteristics. In another series of studies, the data from each of these cultural groups and from other cultural groups will be studied in much greater depth. The major question we want to answer here is: Do cultures differ in the ways children in those cultures perceive the culture's evaluation of divergency? If so, how do these perceptions differ?

Role of Divergency in the Creative Personality

Such considerations are of especial importance in our search for information about what conditions will foster creative development, since almost by necessity anyone who creates anything really new or original must, at least in the very beginning, diverge from what is accepted. Thomas Carlyle once remarked that any new opinion in the very beginning places its originator in a minority of one. Almost always those men and women who have made outstanding creative contributions to society have been regarded as divergent, as non-conforming. Modern psychological studies of creative persons such as those of MacKinnon (1962) and his co-workers emphasize this point. These studies also indicate that the non-conformity of creative persons is not deliberate. It is natural and unavoidable. Goertzel and Goertzel (1962) on the basis of their studies of the lives of 400 eminent people maintain that the non-conformity of the creative person is not self-conscious or forced. The creative person is not able to do otherwise. They explain that when parents permit a child to be different from his playmates or involve him in unusual learning situations, they are contributing to this kind of development. Usually, however, the parents and onlookers regard these as acts of weakness rather than strength.

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Crutchfield (1962) and others have conducted experiments which argue that conformity pressures are deterrents to creative thinking. He explains (p. 125) that the outer pressure and inner compulsion to conform arouse extrinsic, ego-involved motives in the person trying to solve a problem. Since his main efforts tend to become directed toward the goals of being accepted and rewarded by the group, of avoiding rejection and punishment, the search for the truth (solution of the problem) becomes secondary. This makes his thinking processes become less flexible, insights less sensitive, and perceptions distorted. Crutchfield has also identified important differences in type and nature of conformity behavior. The basic type which he has studied most extensively is the conforming person who is brought to comply with the group through a weakened conviction about his own judgment and to assume that the group is right and he is wrong. Another type is the expedient conformer who chooses deliberately to express outward agreement with the group even though his inner judgment remains uninfluenced. Even this kind of conformity has rather subtle coercive effects on independent thinking, as has been found in several studies (Hovland, Janis, Kelley, 1953).

Concern of Children About Divergency

As my staff and I began to observe the manifestation of divergent behavior among children in 1958 and 1959, it seemed rather clear that being different did not bother young children (five and six-year olds) very much. Increasingly, however, they seemed to become concerned about the consequences of being different as they grew older. This seemed to apply to socially approved as well as to socially disapproved behavior. They were afraid to appear too bright, too studious, too hard-working, too honest, or too productive in any way. By the preadolescent stage, around the fourth, fifth, and sixth grades, it seemed to us that children understood well the awesomeness of being different.

We soon began to observe that children used many devices and strategies to avoid being noticed or identified as being divergent. Hughes Mearns (1941) had observed and commented upon these phenomena much earlier. He observed that a majority of youngsters "manage adroitly to avoid the horrid exposure" of being different. He found that they evade, conform outwardly, keep out of sight, perform their divergent activities in secret, assume an impassive exterior that frees them from too much cross-examination. Thus, they save themselves from what Mearns terms "an unequal and surely losing conflict." He says that the creative teacher must understand all this, must prove his friendship and thus win the opportunity "to turn their original sin into approved artistry." Meanwhile, he must give them the needed protection and peace "which their small souls have always craved."

Procedures

Subjects

Preadolescent children were chosen as the subjects of the study for several reasons. By this stage (about 9 to 11 years of age), children realise the awesomeness of being different. Even if they do not consciously recognise this, they symbolise it in their imaginative stories (fantasies). Also, at this age children enjoy writing imaginative stories and are not so severely handicapped in writing their own stories as are younger children. Chosen for this study are the following samples; 215 stories chosen randomly from approximately 1200 stories written by fourth, fifth, and sixth grade children in the Twin Cities; 218 stories written by the total enrollment in the fourth, fifth, and sixth grades of an elementary school in International Falls, Minnesota; 156 stories written by children at similar educational levels in the Fairchildes Junior School, Croydon, England; 226 stories by children at the same educational level in Paris and Roanne, France; 371 stories written by fifth and sixth grade children in Puerto Rico; 192 stories written by children in four different American schools in Turkey; and a sample of 200 stories drawn randomly from approximately 700 stories by children at similar grade levels in Athens and Piraeus, Greece.

Imaginative Stories

In all cases, children were given 20 minutes in which to write imaginative stories of animals or persons with divergent characteristics. The lists of suggested titles given in Chapter 4 were used. Children in all instances were asked to write their stories in their native languages. The stories were then translated by expert linguists in French, Spanish, Turkish, and Greek. The Turkish and Greek stories were analysed both by individuals expert in the language using the original stories written by the children and by an independent analyst on the basis of the translated stories. Agreement better than 90 per cent was obtained in all cases.

Coding and Analysis of the Stories

The analysis and coding of the stories was based on the assumption that in fantasy materials such as these, children reveal their perceptions of the ways in which their cultures value and deal with divergent behavior or characteristics and that by combining the perceptions of a reasonably large number of children we can obtain a useful picture of the varieties of attitudes, kinds of pressure, etc. of a culture. No claim is made for the representativeness of the Twin Cities and International Falls samples of the entire United States or of the state of Minnesota, of the Paris and Roanne samples of the whole of France, and so on. There are certainly unique cultural groups within each of these larger cultures. Yet it seems that national cultures are rather pervasive and that the results obtained can be treated in a speculative manner for hypotheses and leads for research questions which may prove useful.

In devising the coding system, an attempt was made to represent as faithfully and as completely as possible the way divergency is evaluated and the ways in which pressures to conformity operate. The analysis centers around the following six general issues:

1. Sources of pressure to conform (get rid of divergency): This subcategory is concerned about exercised pressure, if there is any, upon the subject to conform or get rid of the divergency, and where this pressure is coming from. Who or what makes the divergent being conform?
2. Kind of pressure: How is this pressure expressed or enforced on the story character?
3. Effects of pressure: What is the reaction of the story character to the exercised pressure?
4. Concern about cause of divergency: Does the child have the curiosity to find out what caused the divergency? Or does he simply write a story about divergency without concern about the causes of divergency?
5. Causes of divergency: What is the nature and form of the influences that caused divergency?
6. Value of divergency: Is the divergency seen as a defect or a potentiality?

1. Sources of Pressure

In determining the sources of pressure, the following eight classifications were used. (Others may be added as different cultures are studied and as different sources of pressure to conformity become apparent):

1. Self: The child himself determined how to react to the divergency. The divergent animal or person is himself the source of his pressure to conform.
2. Parents: One or both parents urged or forced him to conform.
3. Peers: Peers influenced him in determining how to react to divergency.
4. Society: The society in general urged or forced him to conform or he took into consideration the common opinion in order to decide how to react to his divergency. (Include police when seen as agents of society.)
5. Education: The pressure of education (teacher, principal, knowledge, books, etc.) influenced conforming behavior.
6. Nature: Natural forces made him conform (natural discomfort, consequences of "sin").
7. Specific person or animal other than parent, peer, teacher, etc. (doctor, dentist, lawyer, friend, etc.): Did some of them, in any way, influence his decision to react to divergency?
8. No pressure: This category is applied when subject does not mention any kind of pressure to conform or when he is dealing only with the causes of the divergency.

2. Kind or Form of Pressure

In categorizing the kind or form of pressure exercised to influence the divergent animal or person to conform or rid himself of his divergency, the following classifications were used:

1. Verbal advice: The influential person (or animal) simply expressed his opinion, gave verbal advice or counsel, etc.

2. Laughter ridicule: The divergent being was ridiculed, laughed at, made fun of, disparaged, etc. by another person(s) or animal(s) for being different.

3. Criticism: The divergent person or animal was criticized for being different.

4. Social isolation or avoidance: The divergent person or animal was isolated or rejected by the environment for being different.

5. Expression of hostility, threat: The environment expressed hostility toward the divergent person or animal, threatened bodily harm, etc. because of the divergent characteristic or behavior.

6. Coercion, force, use of power or authority to command: The divergent animal or person was forced to conform by some power or authority.

7. Professional remedial or therapeutic treatment (medical, psychiatric, educational, etc.): Some remedial or therapeutic treatment was given to bring about conformity or rid divergent being of divergency.

8. Questions asked: The divergent person or animal was questioned about his divergency in such a way as to influence conformity.

9. Surprise, puzzlement, curiosity: The environment of the divergent being showed some surprise or wonder about the divergency. Someone asked indirect questions about it.

10. Other unclassified: Any other kind of reaction of the environment toward the deviating person or animal.

3. Effects or Consequences of Pressure

1. Destruction, death: The writer believes that divergency led the subject (the divergent animal or person) to destruction or death.

2. Willing resistance: The subject resisted pressures against divergency willingly (did not give in, was not coerced).

3. Unwilling resistance: The subject resisted without his will (wanted to conform or get rid of divergency but was unable to do so).

4. Willing conformity: The subject was satisfied with conformity and was apparently happy to be rid of the divergency.

5. Unwilling conformity: The subject did not want to conform or rid himself of his divergency but was so overwhelmed that he was forced to do so.

6. Other: The subject reacted by a different unclassified way.

This category is not coded, if the subject was not subjected to any pressure.

4. Concern About Causes of Divergency

1. No concern: The story was written without any concern for the reasons, circumstances, influences, etc., which caused the divergent behavior or characteristic.

2. Rejects the possibility of divergency: This category is applied when the writer refuses to consider the possibility or fantasy about the divergency, declares, "It cannot be."

3. Concerned exclusively about causation: The entire story explains how the divergency occurred and tells little or nothing about the consequences.

4. Concerned about causes of divergency, but not exlusively: The writer, in addition to this story about the divergent subject and his activities, explores the causes of the divergency.

5. Causes of Divergency

1. Fears: Fear forced the subject to deviate. "Scared into it."

2. Laziness, incompetence: The divergent subject found divergency a means of coping with his incompetence or laziness, least expensive way of adapting, etc.

3. Snobbery: The divergent behavior was imposed upon the subject because of his snobbery, because he excelled others, etc.

4. Accident: Divergency was caused by some kind of accident, illness, etc.

5. Aging process: The divergency is due to the maturation or aging process (marriage, retirement, reduction of physical strength, etc.).

6. Grief: Some sorrowful event caused the divergent behavior.

7. Inadequacy: The divergency is due to some inability of the subject to cope with the situation normally.

8. Punishment: The divergency was imposed upon the subject as a punishment for his misbehavior, error, mistake, etc.

9. Distraction: The subject absorbed by some thought, event, etc., failed to do what he usually does.

10. Positive goal: The subject resorted to the divergency as an effective means of accomplishing his goals or desires.

11. Greed: The subject's greediness brought about the divergency.

12. Mistake, error: The divergency was the result of some mistake, error, or poor judgment.

13. Love: The love or devotion of the subject for someone caused the divergency.

14. Anger: In a siege of anger the subject displayed behavior different from his usual, normal behavior.

15. Education: The divergency was the result of special education or training or the lack of it.

16. Other: The divergency was caused by other factors than the above mentioned.

6. Evaluation of the Divergency

1. Negative: The divergency is seen as bad, evil, handicapping, incapacitating, etc.

2. Neutral: The divergency is accepted as neither good nor bad, handicap nor potential, etc.

3. Positive: The divergency is seen as having a potential for good, for achievement, etc. Has positive possibilities.

Results

Extent to Which Pressure Against Divergency is Perceived

Comparative data are presented in Table 20.1 to examine the questions,

Table 20.1

Comparison of Perception of Pressure Against Divergency According to Stories Written by Preadolescent Children in Seven Different Cultures

Cultural Group	Number	Perception of Pressures	
		Number	Per Cent
Twin Cities, USA	215	112	52.1
International Falls, Minnesota, USA	218	153	70.2
New Addington, Croydon, ENGLAND	156	76	48.7
Paris and Roenne, FRANCE	226	96	42.5
San Juan, PUERTO RICO	571	322	56.4
Tarsus, Talas, Izmir and Istanbul, TURKEY	192	83	43.2
Athens and Piraeus, GREECE	200	72	36.0

NOTE: Over-all chi-square = 19.60; *df* = 6; significant at less than the .01 level of confidence

"To what extent do preadolescent children perceive the existence of pressures against divergency?" and "Are there significant differences among cultures?" It will be observed that about one-half of the subjects do perceive the existence of pressures against divergent behavior, ranging from 36 per cent in the Greek sample to 70 per cent in the International Falls sample. The over-all chi-square indicates that the differences among these seven cultural groups are statistically significant and would occur by chance less than once in 100 times. It will be noted that all three of the New World groups (Twin Cities, International Falls, and Puerto Rico) tend more frequently to perceive pressures against divergency than the Old World groups (England, France, Turkey, and Greece). The difference in proportion is significant at better than the .01 level of confidence. One might ask whether this difference is due to a higher awareness on the part of children in these New World cultures or to greater pressures against divergency.

Sources of Pressure Against Divergency

The major sources of pressure against divergency appear to be classifiable as oneself (inner compulsion), parents, peers, society in general, and other specific persons in the culture such as teachers, doctors, police, and the like. When a story gave evidence of perception of pressure against divergency, the source or sources of pressure were classified into these categories. The results of these analyses are presented in Table 20.2. It will be noted that the differences among cultural groups are quite significant (less than the .001 level of confidence) except in the case of "parents."

Table 20.2

Comparison of Sources of Pressure Against Divergency in Stories of Preadolescent Children in Seven Different Cultures

Cultural Group	Number Pressured	Sources: Per Cents				
		Self	Parents	Peers	Society	Others
Twin Cities, USA	112	8.9	0.9	36.6	4.4	54.4
International Falls, Minnesota, USA	153	19.6	6.5	7.8	37.8	21.6
New Addington, Croydon, ENGLAND	76	17.2	5.3	13.2	22.4	42.2
Paris and Roanne, FRANCE	96	9.4	5.2	2.1	18.7	61.4
San Juan, PUERTO RICO	322	28.8	5.0	13.0	14.3	46.2
Izmir and Istanbul, TURKEY	83	26.3	8.8	13.8	21.3	32.5
Athens and Piraeus, GREECE	72	15.2	5.5	8.3	14.0	56.9

NOTE: Chi-square (Self) = 33.937, significant at better than the .001 level.
Chi-square (Parents) = 6.645, not significant
Chi-square (Peers) = 67.545, significant at better than the .001 level
Chi-square (Society) = 58.147, significant at better than the .001 level

The Twin Cities group appear to be by far the most peer-oriented group. It is especially interesting to note that the Twin Cities group is the most peer-oriented and the least society-oriented while the International Falls group is among the least peer-oriented and the most society-oriented. Although these two groups are located in the same state, International Falls is a relatively small city and is rather isolated in the northern part of the State near the Canadian border. (It might also be mentioned that a Toronto, Canada, sample showed essentially the same pattern as the International Falls sample.) It is difficult to say whether this is a rural-urban difference or a regional difference in which International Falls identifies more strongly with the Canadian culture than with the Twin Cities culture. It will be noted that the Turkish and English groups also tend to be society-oriented.

The French children show the least peer-orientation of any of the groups. They see most of the pressures as coming from specific persons other than self, parents, and peers. People in special roles exert the pressures in the stories of French children.

The Puerto Rican and Turkish children considerably more frequently than the other groups see the inner compulsions of the individuals as the source of pressure. Individuals in special roles seem to be important in the perceptions of the Puerto Rican child and society as a whole is relatively important in the stories of the Turkish children.

The Greek children are among the least peer-oriented and most inner-directed. A majority of their stories, however, described persons in special roles as the source of pressures to conformity.

Parental pressure does not dominate in any of the groups but seems to be weakest in the Twin Cities sample and strongest in the Turkish sample.

Nature and Form of Pressures Against Divergency

In the stories in which there were pressures against divergency, an attempt was made to classify the nature and form of the pressure. The results are presented in Table 20.3 in the form of percentages classified in each category for each of the cultural groups. Again, it will be noted that the differences among cultures is highly significant statistically.

It will be noted that pressure in the form of verbal advice and admonition is more common in the Anglo groups (Twin Cities, International Falls, and Croydon) than in any of the other groups. When this category is taken separately, the difference in proportion for the Anglo groups is significantly greater than in the non-Anglo groups (at better than the .01 level of confidence).

Laughter and ridicule appear to be more commonly used in the New World groups than in the Old World groups. Considering this category alone, the difference in proportions is significant at less than the .01 level of confidence.

Criticism appears to be a more common device of pressure in the stories by the children in non-Anglo Old World cultures than in the Anglo cultures and in the New World groups (significant at less than the .01 level). Criticism seems to be least frequent in the stories of the Puerto Rican children.

The use of social isolation as a pressure against divergency is most common in the stories of the French and Turkish children and least frequent in those of the Greek and Twin Cities children. The occurrence of hostility and the use of threats exhibits a similar phenomenon. Hostility and threat occur rather frequently in the Puerto Rican stories also. This trend becomes even stronger when we consider the category of coercion, force, and power. This category is found in the stories of the French, Turkish, and Puerto Rican children over twice as frequently as in any of the other groups and is weakest in the Greek stories.

Table 20.3

Comparison of Nature and Form of Pressure Against Divergency in Stories of Preadolescent Children in Seven Different Cultures

Nature and Form of Pressure	Per Cents Twin Cities	Int'nat'l	England	France	Puerto Rico	Turkey	Greece
Verbal advice, admonition	5.3	10.5	13.2	2.1	2.5	4.8	4.1
Laughter, ridicule	16.0	19.0	1.3	5.2	10.6	4.8	6.9
Criticism	3.5	1.3	1.3	8.3	0.6	18.1	9.7
Social isolation	0.9	7.8	6.6	14.6	5.9	15.7	1.3
Hostility	0.9	2.6	5.3	12.5	7.8	8.4	0.0
Coercion, power	10.7	12.4	11.9	36.4	23.3	25.3	6.9
Medical, other treatment	18.7	17.6	38.2	5.2	20.2	20.5	8.3
Questions asked	3.5	8.5	9.2	8.3	3.4	0.0	4.1
Surprise	25.8	3.3	4.0	8.3	5.6	3.6	31.9
Other unclassified	16.9	13.7	11.9	0.0	23.9	0.0	29.0
Total pressured	112	153	76	96	322	83	72

NOTE: Chi-square (verbal advice) = 24.477, significant at better than the .001 level
Chi-square (laughter) = 28.828, significant at better than the .001 level
Chi-square (criticism) = 63.368, significant at better than the .001 level
Chi-square (social isolation) = 28.297, significant at better than the .001 level
Chi-square (hostility) = 23.472, significant at better than the .001 level
Chi-square (coercion) = 43.159, significant at better than the .001 level
Chi-square (medical) = 36.405, significant at better than the .001 level
Chi-square (questions) = 15.575, significant at better than the .02 level
Chi-square (surprise) = 93.895, significant at better than the .001 level
Chi-square (other) = 60.964, significant at better than the .001 level

The use of medical, remedial, and psychotherapeutic forces are employed in the stories of the English children more frequently by far than in any other group. This category appears least frequently in the French and Greek stories.

Interrogation does not appear with very great frequency in any of the groups but is somewhat more frequent in the English, French, and International Falls stories. Especially noted is its lack of occurrence in the Turkish stories. This is especially interesting in the light of the reputation of Turkish soldiers for their relative invulnerability to interrogation as a coercive technique in the Korean POW camps during the early 50's.

Shock and surprise as pressures against divergency are found most commonly in the stories of the Greek and Twin Cities children (significant at less than the .01 level of confidence).

Effects of Pressures Against Divergency

The comparative data on effects of reactions to pressures against divergency are presented in Table 20.4. Again, we find that there are large over-all differences among the groups concerning the consequences or outcomes of pressures against divergency.

Table 20.4

Comparison of Reactions to Pressure Against Divergency as Reflected in Stories of Preadolescent Children in Seven Different Cultures

Cultural Group	Number Pressured	Per Cents					
		Fatality	Will.Res.	Unw.Res.	Will.Conf.	Unw.Conf.	Other
Twin Cities	112	2.6	27.6	33.7	0.0	29.4	6.7
Int. Falls	153	3.9	17.6	13.7	27.4	7.8	29.6
England	76	0.0	14.5	25.1	13.2	11.9	35.3
France	96	9.4	32.2	3.1	10.4	11.4	33.5
Puerto Rico	322	8.7	14.0	23.0	30.1	9.6	14.6
Turkey	83	10.8	13.3	0.0	27.7	28.9	19.3
Greece	72	8.3	34.7	27.7	4.1	11.0	14.2

NOTE: Over-all chi-square = 236.69; df = 30; significant at better than the .001 level of confidence.

It is of special interest that the non-Anglo groups more frequently than the Anglo groups perceive the consequences of pressures against divergency as being fatal. It is still more interesting that there is total lack of occurrence of this category in the stories written by the children in England. This is of interest because England is frequently given credit for doing a better job than almost any other culture of preparing individuals to cope with failure. Mistakes and errors are perceived as things to be coped with and are simply not seen as fatal. It is some slight relief that we find that this category is also relatively low in the two Minnesota groups.

Active resistance (willing resistance) is described more frequently in the stories of the Greek, French, and Twin Cities stories than in the other groups. The Greek and Twin Cities stories also have a rather high occurrence of unwilling resistance (wanting to conform but being unable to do so) but the French along with the Turkish show an almost total lack of this phenomenon. The English and Puerto Rican stories, however, show a rather high willingness to conform but inability to do so. Willing conformity is highest in the Puerto Rican, Turkish, and International Falls stories and lowest in the Twin Cities, Greek and French stories. Unwilling conformity appears most frequently in the Twin Cities and Turkish stories and least frequently in the International Falls and Puerto Rican accounts.

Concern About Causes of Divergency

Some of the stories about animals and persons with divergent characteristics are concerned entirely with the problem of trying to understand the cause of the divergency. Others are concerned almost entirely with the consequences of the divergency or with ways of eliminating or correcting the divergency, while some stories show a balance between the two. A few even rejected the possibility of the divergency and refused to consider such a possibility. Each story was classified into one of the four categories with the results shown in Table 20.5. It will be noted immediately that the seven cultural groups differ markedly among themselves in the concern for causation shown in the stories.

Table 20.5

Comparison of Concern About Causes of Divergency in Stories by Preadolescent Children in Seven Different Cultures

Cultural Group	Total Number	No Concern		Rejects Poss.		Cause Elabor.		Mod. Concern	
		Number	Pct.	Number	Pct.	Number	Pct.	Number	Pct.
Twin Cities	215	62	28.8	0	0.0	25	12.1	128	59.1
Int. Falls	218	77	35.3	1	0.5	12	5.5	128	58.7
England	156	57	36.5	0	0.0	15	9.6	84	53.9
France	216	183	80.9	1	0.5	7	3.1	35	15.5
Puerto Rico	571	350	61.3	7	1.2	17	3.0	197	34.5
Turkey	192	92	47.9	1	0.5	10	5.2	89	46.4
Greece	200	35	17.5	2	1.0	39	17.5	124	62.0

NOTE: Over-all chi-square = 309.60; df = 18; significant at better than the .001 level of confidence

It is immediately apparent that the French children show the least concern about causation while the Greek children show the greatest concern. In general, the French children assumed that the divergency is possible or at least showed no hesitancy in going ahead immediately with the fantasy activity. Thus, the percentage showing no concern is higher for the French sample (80.9 per cent) than for any other cultural group. The Puerto Rican children also show a relatively high lack of concern for cause. The Greek, Twin Cities, International Falls and English groups show the greatest concern for causation. In general, the Greek stories reflect little interest in eliminating or correcting the divergency. The major interest is in trying to understand the divergency.

Causes of Divergency

An effort was made to classify the cause or causes of the divergency of each story which showed any concern for causation. The results are presented in Table 20.6 in terms of the percentage in each group mentioning each of the causes. Several rather remarkable differences among the cultural groups will be noted.

Table 20.6

Comparison of Causes of Divergency Reflected in Stories of Preadolescent Children in Seven Different Cultures

Causes	Twin Cities	Int'natl. Falls	England	France	Puerto Rico	Turkey	Greece
Fear	9.1%	9.3%	4.3%	11.9%	6.5%	3.0%	4.9%
Lazy, incompetent	3.9	1.4	3.5	0.0	0.5	0.0	1.2
Snobbish	0.6	5.0	0.7	2.4	5.6	5.0	1.2
Accident	26.7	16.4	17.0	4.8	16.8	6.1	16.5
Aging	4.5	0.0	0.0	0.0	0.9	5.0	4.2
Sad, grieved	8.4	4.3	5.0	0.0	2.3	5.0	11.6
Deformity	3.2	7.9	8.4	2.4	4.2	3.0	4.3
Punishment	0.0	1.4	1.4	0.0	4.2	6.1	2.4
Distraction	0.6	0.0	0.0	0.0	0.0	0.0	0.6
Positive goal	12.4	16.4	1.4	23.8	8.4	17.2	26.9
Greediness	0.0	1.4	0.0	0.0	1.4	1.0	1.8
Mistake, error	2.6	0.7	2.1	0.0	0.9	1.0	2.4
Love	0.0	10.0	2.1	0.0	3.3	3.0	0.0
Anger	8.4	5.0	4.3	0.0	0.0	0.0	1.8
Education	0.0	14.3	9.9	0.0	48.6	43.4	2.4
Other	20.9	1.4	9.9	45.2	0.9	1.0	19.6
Total Number Concerned About Cause	153	140	141	42	214	99	163

NOTE: Chi-square (Fear) = 8.645, not significant
Chi-square (Accident) = 19.651, significant at better than .01 level
Chi-square (Sad, etc.) = 19.936, significant at better than .01 level
Chi-square (Pos. Goals) = 44.928, significant at better than .001 level
Chi-square (Education) = 173.068, significant at better than .001 level

In the French and Twin Cities groups, education is not perceived as a cause of divergency in any of the stories, whereas almost one-half of the Puerto Rican and Turkish stories concerned about causation saw education as the cause of divergency. Relatively few of the Greek and English children saw education as a cause of divergency.

The groups also differ markedly in the occurrence in the stories of divergency as a way of achieving positive goals. Such occurrences were most frequent in the Greek and French stories and were least frequent in the Puerto Rican and English groups (differences significant at better than the .01 level of confidence).

The following are differences of less magnitude. The French and United States stories picture fear as a cause of divergency more frequently than other groups. Snobbishness is mentioned most frequently in the Puerto Rican, Turkish, and International Falls samples. The Twin Cities stories mention accidents most frequently and the Turkish stories refer to accidents least frequently. Grief is mentioned most frequently by the Greek and Twin Cities children and least frequently by the French children. Punishment is most frequent in the Turkish and Puerto Rican stories and is virtually absent in the French and Twin Cities stories.

Evaluation of Divergency as Positive or Negative

For each story an effort was made to determine the writer's evaluation of divergency. Any indication that divergency has any positive potentialities, can be used to advantage, or possesses any virtue was coded as "positive." If the divergency was seen as an unalterable handicap, an indication of evil, etc., it was coded as negative. If the divergency was not evaluated or was described as neither valuable nor handicapping, good nor evil, it was coded as neutral. The results of this analysis are presented in Table 20.7. Again it will be noted that preadolescent children from the

Table 20.7

Comparison of Evaluation on Divergency in Stories of Preadolescent Children In Seven Different Cultures

Cultural Group	Total Number	Negative		Neutral		Positive	
		Number	Per Cent	Number	Per Cent	Number	Per Cent
Twin Cities	215	123	57.2	18	8.4	74	34.4
Int. Falls	218	118	54.2	43	19.7	57	26.1
England	156	80	51.3	34	21.7	42	27.0
France	226	76	33.6	35	15.5	115	50.9
Puerto Rico	571	234	41.0	67	11.7	270	47.3
Turkey	192	84	43.7	20	10.2	88	46.1
Greece	200	32	16.0	83	41.5	85	42.5

NOTE: Over-all chi-square = 190.99; df = 18; significant at better than the .001 level of confidence seven cultural groups under study do indeed reflect different evaluations of divergency.

The three Anglo groups tend to perceive divergency more negatively and less positively than the non-Anglo groups (significant at better than the .01 level of confidence). The Greek children less frequently than any of the other groups see divergency as negative (significant at better than the .01 level for each group). The Greek children, however, tend to see divergency as neither positive nor negative. The French children, however, show a somewhat stronger tendency than any other group to see divergency as positive.

Discussion

Even a casual glance at the differences among the seven cultural groups which contributed stories generate a wealth of hypotheses about the way these cultures evaluate creative behavior in children. It is not the purpose of this chapter to examine these dynamics, although this will be done in a set of studies to be reported elsewhere. The major purpose of this chapter was to determine if stories about animals or people with divergent characteristics written by preadolescent children from different cultural groups reflect different evaluations of divergency. On this point, the data are quite conclusive. The differences among these cultural groups are statistically significant to a high degree on the extent of the pressures against divergency, the sources of the pressures, the nature of the pressures, the effects of these pressures, concern about the causation of divergency, the nature of the causes of divergency, and the evaluation of the divergency.

Some of the data which have been presented herein, together with additional data from these cultural groups and from other cultural groups, will be examined in considerable depth in another series of studies. These data were presented merely to answer the question posed above and thus to fill this rather important gap in our knowledge concerning the role of evaluation in developing creative thinking.

Summary

An analysis was made of stories written by preadolescent children about animals or persons possessing some divergent characteristic or exhibiting some divergent behavior. Included were 215 stories from Minneapolis and St. Paul, Minnesota; 218, from International Falls, Minnesota; 158, from Croydon, England; 226, from Paris and Roanne, France; 571, from San Juan, Puerto Rico; 192, from Izmir, Istanbul, Tarsus, and Talas, Turkey; and 200, from Athens and Piraeus, Greece.

It was found that the over-all differences among the stories from these seven cultural groups show rather large differences in the extent of the pressures against divergency, the sources of the pressures, the nature of the pressures, the consequences of the pressures, concern about the causation of divergency, the nature of the causes of divergency, and the evaluation of the divergency. It was found that about one-half of all of the stories describe the existence of pressures against divergency. Children from the New World cultures more frequently perceived pressures against divergency than did children from the four Old World cultures.

In terms of source of pressure, the Twin Cities children show the greatest peer-orientation and the least society-orientation. Children from International Falls, however, show a strong society-orientation. French children show the least peer-orientation and see most of their pressures coming from persons occupying specific cultural roles. Turkish and Puerto Rican children seem to be more strongly oriented toward inner compulsions or the self as the source of pressure.

Pressures in the form of verbal advice and admonition are most common in the stories written by Anglo subjects. Laughter and ridicule are more common in the stories of children in the New World than in the Old World cultures. Criticism is most common in the non-Anglo Old World cultures and is least common in the Puerto Rican stories. Social isolation as a pressure is most common in the French and Turkish stories and least frequent in the Greek and Twin Cities stories. The use of coercion, force, and power figure more prominently in the accounts by French, Turkish, and Puerto Rican children than in the other groups. The use of medical, remedial, and psychotherapeutic forces is more frequent in the English stories and least frequent in the French and Greek stories. Interrogation appears most frequently in the English, French, and International Falls stories and least frequently in the Turkish stories. Shock and surprise are most frequent in the Greek and Twin Cities stories.

Children from the non-Anglo cultures more frequently describe the consequences of pressure against divergency as being fatal than children from the Anglo cultures. Active resistance is most common in the stories by Greek, Twin Cities, and French children while willingness to conform with inability to do so is most common in the stories by English and Puerto Rican authors. Willing conformity is highest in the Puerto Rican, Turkish, and International Falls stories and lowest in the Twin Cities, Greek, and French stories. Unwilling conformity is most frequent in the Twin Cities and Turkish stories and least frequent in the International Falls and Puerto Rican accounts.

The French stories reflect the least concern about the causation of divergency and the Greek stories show the greatest concern about the causes of divergency. Quite interestingly, these two cultures show the least negative evaluation of divergency. The evaluation placed upon divergency by the Greek children, however, tends to be neutral while that expressed by the French children tends to be more positive. The Anglo groups more frequently than the non-Anglo groups express negative evaluations of divergency.

Chapter 21[1]

HELPING CHILDREN VALUE THEIR IDEAS

In spite of the fact that ideas about the importance of the individual's own evaluative behavior in creativity have attracted little attention among educators, many students of creative behavior have expressed such ideas and given them places of importance. Sesnitivity to deficiencies has been included by Guilford (1951) and others as an important element in creative thinking. Rossman (1931), in studying the psychology of the inventor, concluded that the non-inventor tends to "cuss" the deficiencies of the environment, whereas the inventor engages in constructive criticism. Pepinsky and Pepinsky (1958) have hypothesized that original ideas come from individuals who place a high value on individualism and "seeing standing out from the crowd" as a potential symbol of success rather than failure. Such individuals also state criticism in a constructive and depersonalized way. Rogers (1954) has emphasized the importance of the internal locus of evaluation in creativity. The study described in this chapter represents an attempt to develop and test one procedure for helping children learn to value their own ideas.

Procedures

Subjects

The subjects of this study were the one hundred children enrolled in the third, fourth, fifth and sixth grades of the University of Minnesota Elementary School, each class being limited to 25 pupils. Although the University Elementary School is not a school specifically for gifted children, a large percentage of its enrollment would be classified as gifted by most criteria -- achievement well above grade level, mean intelligence quotient of 127, and high scores on tests of creative thinking. Their parents possess a high level of education (median education of fathers is five years of college and of mothers, four years of college.) and come largely from such professions as university teaching, medicine, law, engineering, journalism, govermental work, industrial research, and the like. Most of the teachers of the school are young, talented, and provide considerable opportunity for learning in creative ways. Some of the teachers involved in the present study, however, rather definitely preferred the more authoritarian ways of teaching.

Experimental Procedure

The four teachers involved in the study were asked to go ahead with regularly scheduled activities and not to give their pupils any "extra" instruction in creative writing during the six-week period of the study. An attractive magazine consisting of the writings and illustrations of the children involved in the study was used as the medium through which we tried to help the subjects learn to value their own ideas. Through this medium, we hoped to stimulate these 100 children to do a great deal of writing on their own and to form the habit of recording their ideas -- something children do not normally do. Most important, it was hypothesized that they would learn to value their own ideas and those of their peers and that this would be reflected by growth in creative writing.

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[1] I am indebted to Dr. Kaoru Yamamoto, Mr. Vincent Johnson, and Miss Roberta Miller for their assistance in preparing this chapter.

The experiment was launched with the following instructions presented both informally and in mimeographed form:

> Your ideas are important! But their value is lost unless you record them -- "write them down." People have their best ideas at the funniest times and places. In fact, many of the world's greatest inventors and scientific discoverers say that their great ideas occurred to them when they were in the bath tub, at church, or just walking along. It pays to have an "idea trap" -- a small note pad and pencil or something similar to record your ideas when they occur and before they are forgotten.
>
> During the next six weeks we would like for you to "trap" your ideas. As ideas for stories, poems, jokes, songs, and the like come to you, write them down. If you think of an idea in the middle of an arithmetic lesson, you may not be able to write it out just that minute, but you can write down just a few words to remind you of your idea later. Then, the first chance you get write it out in detail.
>
> This is the way our creative writing project will work --
>
> ...Everytime you think of a new, interesting, or unusual idea, write it down. You may write it in the form of a story, a poem, a song, a play, a joke, a game, or in whatever way you like. You might want to illustrate it with a picture. Write about unusual and interesting daily experiences in school, in the neighborhood or at home, weekend experiences, your reactions and feelings about school activities, unusual ideas for new inventions, discoveries, games, and the like.
>
> ...As soon as you have written down your idea -- trapped it -- put it into the large brown envelope which you have been given. Keep adding to it. Each Friday, you will be asked to choose from your envelope the idea you think others will enjoy most. These will be turned over to me or one of my assistants. We shall pick out the ideas that we think others will enjoy reading and each week, a magazine containing your ideas will be "published." You will receive a copy of this magazine and will see your ideas and those of other University Elementary School boys and girls "in print."
>
> IN BRIEF, THIS IS WHAT WE WANT YOU TO DO:
>
> 1. Today, write a 15-minute story just for practice -- a brief workout.
> 2. By tomorrow, try to think of a name for the magazine. Write your suggestion on the white card in your envelope along with your name and give it to your teacher.

3. As you write down your ideas, put them into your envelope.
4. Each Friday for the next six weeks, pick out the writing which you think will be of most interest to others.
5. Don't throw any of your ideas away. You may like some of them better when you read them again in two or three weeks.

Remember -- your ideas are important. Others will enjoy reading them, but they become lost if you don't write them down.

Each pupil was presented with a large brown envelope which was to serve as the "bag" for his "trapped" ideas and a copy of the foregoing statement. On Fridays, one of the experimenters visited the four classes and asked each pupil to select from his envelope those productions which he thought others would enjoy most. From these, selections were made for the children's own weekly magazine, named by them Ideas of the Week.

Each of the six issues of Ideas of the Week had a catchy colored cover whose design was selected from drawings submitted by the children. Items were divided into five sections: Stories, Poems, Inventions, Opinions, and Jokes and Cartoons. The magazine was distributed each Thursday afternoon to help stimulate writing on the eve of the day for new ideas to be submitted. Much enthusiasm was demonstrated at the time copies were delivered. The deliverer was practically mobbed on each occasion. Interest also ran high among parents, teachers, and members of the research staff. During the six weeks of its publication, Ideas of the Week grew from the first issue's 11 pages to 24 pages of items in Issue Number Six.

Assessment Instruments

To help evaluate the outcomes of the experiment, all subjects were asked to write an imaginative story at the beginning and end of the experiment. As in other experiments on creative writing described in this volume, subjects were asked to write about animals or people with divergent characteristics, such as: "The Dog That Doesn't Bark," "The Woman Who Can But Won't Talk," "The Doctor Who Became a Carpenter," and "The Flying Monkey." (The complete lists of subjects are given in Chapter 4.) Three scores were chosen as most appropriate in terms of the goals of the study: Yamamoto's Composite Creativity Score, Torrance's Revised Originality Scale, and Torrance's Interest Scale.

At the end of the experiment, each pupil filled out a two-page questionnaire concerning his own experiences during the six-week period and his evaluation of his writing experiences. Each pupil was also interviewed by Miss Roberta Hiller who served as the editor of the magazine. (An analysis of these data will be presented in Miss Hiller's M.A. thesis. Except for some highlights from Miss Hiller's analysis, this chapter will be limited to qualitative evaluations and an analysis of the pre- and post-stories written by the subjects.)

Results

Some of the research staff's most important learnings from the study are those which occurred in our week-by-week contacts with the 100 children participating in the study. There is no question but that the study generated a great deal of enthusiasm and almost all of the children demonstrated obvious delight over one another's productions and with seeing their own productions in print. The teachers and many of the parents also manifested very clearly their sheer enjoyment of the magazine. The growth in creative writing of some of the children who contributed almost weekly was also obvious. Through the interviews and questionnaires administered at the end of the experiment, it was also clear that even some of the non-contributors came to value the ideas of their peers.

Many of the children's creations yielded fresh insight into the emotional problems and conflicts of creative children. In one of her stories, a highly imaginative fifth-grade girl symbolized what seems to be a central problem of many children in the intermediate grades -- a dilemma which causes many to sacrifice their creativity. She called her story "The Green Pig."

> "Once upon a time in a far-off land there was a magic farm that no one ever visited.
>
> "Many different animals lived there. The odd thing about these animals was that they were different colors from regular animals.
>
> "The cows were pink, the horses were purple and the hens and chicks were blue! All the pigs were green. That is, all except for one little fellow who was just plain pink. Nobody wanted to be near him or play with him because he wasn't green. And this little pig was very, very sad.
>
> "One day, as he was walking along he saw a great big puddle of mud. He splashed and rolled in it because he loved the mud.
>
> "When the little pig came out of the puddle, he was all green! And he stayed green for all of his life. And all the other pigs began to play with him."

Even the pre-test, however, produced what has become to me a classic symbol of the problems of many highly creative children, the story of "Glob-Blob, the Duck Who Wouldn't Quack" by a sixth-grade girl:

> "Whack! Whack! They were after him again -- the Ladies Duck Aid Society, with their hair up in pin curls and their screaming, fat ducklings swimming and holding onto their skirts. They never failed. Alas! It was getting too much for little Glob-Blob. Every day there would be quacking and screaming of ducklings while poor Glob-Blob would run as fast as he could to get away from the vicious ducks.

"The reason for this was because poor Glob-Blob could not quack. So every day the Ladies Duck Aid Society would chase Glob-Blob, for they said it was for the good of the ducks, and it was not only right but they were doing him a good turn.

"It was lucky for Glob-Blob that the ducks were fat and flabby, for if they were limber, I will not mention what would happen. But, one day, these lazy ducks did reduce, and when chasing Glob-Blob dealt him a good many hard blows. And the next day, poor Glob-Blob was at last doomed. The vicious quackers came and the chase was on. Glob-Blob was failing. It is a shame that so noble a duck should be doomed, but 'That is life,' said Glob-Blob to himself as, slowly but surely, he dropped to the ground. The quackers, very pleased with themselves, sat down for a chat.

"But I shall always remember Glob-Blob and his death. So I shall let him finish his journey, where there will be no more quackers and chasers, and where at last, he may have passionless peace forever."

As the project progressed, the research staff noticed that animals were frequently chosen as main characters of stories and poems by pupils in all four grades. It was also noted that many children used animal behavior to symbolize and to lampoon human behavior. In follow-up interviews, a sixth-grade girl gave this answer to our query about the reason for her use of animals as main characters, "I can't write stories about people; they don't make sense. People are so limited in what they can do. I'd rather write about animals. I can make them do more things -- especially small animals." The following story points up what she meant:

"Once there was an ant that wasn't very smart, for when winter came he had no chocolate tarts.

"The reason is very simple. In the fall who would want to gather them when the weather is so beautiful? So he just played all day and when winter came he had no food.

"Oh...he must have been hungry and almost starving, the poor little ant.

"Have you ever been hungry and starving? ...Well...poor little ant...well, have you?

"It isn't much fun; the little ant hungry and starving and almost dying.

"Have you ever tried gathering chocolate tarts in the winter? Well?...Well?

"Oh, no! I just found out this ant is just plain lazy and wants sympathy!

"He ruined my story!"

The editors almost overlooked the merits of this story and included it in the first issue only because so few items had been submitted. They were quite surprised to find that it was voted by the children as one of their favorites, both in the first issue and in the entire set of issues.

In their "Opinion" articles our young authors discussed some of their problems quite frankly. The following editorial, "Parents' View of TV," was voted the most popular of the entire writing project:

> "Ever since the first time I watched television, my parents have told me what it does to me.
>
> "When they get mad at my brother or me because we don't do something, they start in about how TV affects us.
>
> "When my mother tells us about it she starts in with, 'You can just sit in front of that box for hours upon hours!!! But do you ever read or go outside?'
>
> "Then she answers her own question with 'NO!' -- which of course is not true, because we are forced outside most of the time. And once in a while we go outside on our own!
>
> "From here on, the story is different, all except for my dad's opening line, which goes something like this: "Since you are infatuated with the commercials and hypnotized by the shows, you never leave the set. Now this has caused a defect in your hearing and seeing!
>
> "Well, that also is not true because I can see and hear as well as I would like to."

The process of interviewing the subjects at the end of the study proved to be an illuminating one. The subjects seemed to remember quite clearly the source of their ideas. When they sensed that their ideas were being respected and written down, they tried to substantiate in detail their reactions. There was tremendous uniformity of answers both within and between grades. The following are some of the highlights from Miss Hiller's summary:

(1) Children in grades three through six can be stimulated to record their ideas on their own. Of the 100 subjects, 90 contributed items. Pupils wrote outside the school's regular curriculum. Youngsters could write and illustrate their ideas when they had completed regular assignments.

(2) Third graders were highest in productivity. Twenty-three of the 25 class members contributed fairly regurlarly, with poems submitted more often than any other type of item. (See detailed results later.)

(3) Significant sex differences appeared on total number of items contributed during the six weeks of the project. Girls contributed a larger mean number of items than boys, statistically significant at the .05 level of confidence.

(4) Majority of the subjects said their ideas occurred to them in school. Reading and arithmetic periods were cited most often.

(5) Ideas came in parts, or evolved in "stages," reported the majority. Ideas were rarely "full blown" when the subjects became aware of them.

(6) In grades three through five, the majority did their writing in school -- after work was completed, at lunchtime, or during recess. Pupils in grade six, however, showed a definite tendency to write at home.

(7) When asked whether they "rough draft and rewrite" or "write just once" the items they handed in, third and fourth graders tended to write just once. But fifth and sixth graders tended to rough draft (as many as two or three times) and then write their final copy.

(8) In early stages of writing, pupils sought "evaluation" from outside sources. Evaluation centered on advice on grammar and punctuation. The final copy was circulated for praise and assurance that "it's suitable" and "good enough" for handing in.

(9) Teachers were sought for evaluation on grammar and punctuation. Parents were mentioned, too. When praise and encouragement were sought, peers of the same sex and same grade were approached most often.

(10) Although pupils volunteered they had learned to value their ideas, they stressed the need of a "reason to write." Three weeks after the last issue of the magazine appeared, 67 per cent of the contributors had written nothing at all. Only 33 per cent had written one item or more.

A highly creative third grader represented reactions to this point when he said, "The magazine helps me put my ideas on paper. I think up many thoughts but never put them down before."

(11) Students were unanimous in praise of the magazine. They liked the idea of having a unique publication of their own. One third grade boy summed up students' sentiment. He said, "I like to write and be like a author." Another third-grade boy said, "I learned how it is to have things in a real magazine. And now I write much more." Said a fifth grader, "I think many people never knew they could write anything good. But when you've got something to write for, you can write a lot easier."

(12) The ten pupils who did not contribute at all gave as their reason, "I have trouble thinking of things." However, later discussions with them revealed them to be "social isolates" who felt their work would be rejected on the basis of their lack of popularity, or the "slow learners" who were fully occupied with completing school work on time.

We found many evidences that the subjects learned to value their ideas. The non-contributors, too, exhibited great enthusiasm for their classmates' creations. Pupils accepted so thoroughly the importance of their ideas that very vocal objections were raised in response to the small amount of editing done by Miss Hiller. She had been instructed to make corrections in spelling and grammar, errors which might prove embarrassing to the author when they appeared in "print." Every effort was made to maintain the integrity of the child's ideas, his style, the flavor of his writing, and the like. During the fourth week of the project, several fifth-grade pupils penned very irate complaints. The following sample complaint was published in the fifth issue of the magazine:

> "Dear Editors:
>
> I don't think you should change our poems, stories, etc. around. I know you are trying to make them better, but sometimes the way people write things -- no matter whether it makes sense or not -- is the way people want them.
>
> In poems this is especially true. Sometimes certain punctuation express an awful lot.
>
> Please try and understand the way we feel about it!"

A complaint not selected by the editor, perhaps out of deference and kindness to the Principal Investigator, is one which he shall never forget and one which may in some respects give us the most important finding of the study. It reads as follows:

> "Dr. Torrance, you told us that our ideas are important. The way our stories and poems have been changed around makes us wonder."

This experience shows how easy it is for adults unconsciously and unknowingly to communicate to children that their ideas are not important. As one evidence of this fact, I have presented the Glob-Blob story of the duck that won't quack to at least a dozen audiences and have included it in two or three different journal articles. In each case, the opening has always been "Quack! Quack! rather than "Whack! Whack!" I was not aware of this error until I re-examined the original data in preparing this chapter almost three years later. Now that I see this error, I think "Whack! Whack!' makes a much more charming beginning than "Quack! Quack!" It is certainly more original.

The following response to complaints about over-editing by Miss Hiller did little to appease the irate fifth-graders. They were extremely cold and unresponsive to the efforts of the principal Investigator to "warm them up" to the task of writing the final test story. As a result it will be noted in the empirical data which follow that their writing showed regression on two of the three criteria used.

> "To Readers of IDEAS OF THE WEEK:
>
> Some say 'clothes make the man,' that a person's appearance is everything! Others believe only the man himself is really important. His thoughts, his character, his actions are all that really count.

> And words are like clothes. Sometimes when you write, your words may not quite fit! Or there may be a few too many so they bulge out of a space! Or your spelling may need mending. Then tailoring (editing) is needed.
>
> Your IDEAS, the body of your writing, are not altered. Editors try not to meddle with the author's own, individual way of expressing himself.
>
> We believe that your IDEAS are the most priceless of treasures. If we didn't, your magazine would not be titled IDEAS OF THE WEEK."
>
> Your Editor

During the individual interviews, the editor tried again as the opportunity presented itself, to clarify the reasons for editing. It became clear that when the children understood the purpose of the editing -- that is, to improve the communication value of one's writing and to fulfill one's responsibility to the reader -- no disagreement arises. If proof-reading and corrections had been made at the time of the writing, the writer's enthusiasm may have made it a manageable task. Since the research staff's only contacts with the subjects was to collect articles and deliver copies of the magazine, this was not possible.

The data which provide the major empirical evidence of outcomes of the experience are presented in Table 21.1. It will be noted that

Table 21.1

Means, Standard Deviations, and Tests of Significance of Difference in Means on Criterion Measures Derived from Pre- and Post-Experimental Imaginative Stories

			Pre-Test		Post-Test		
Grade	Measure	Number	Means	St. Dev.	Means	St. Dev.	T-ratio
3	Originality	21	8.05	4.26	15.05	6.19	6.1060***
	Interest	21	3.48	1.89	5.05	1.53	3.3733***
	Composite Creativity	21	11.76	4.84	14.33	5.82	1.9051*
4	Originality	25	9.32	3.79	14.52	4.49	5.4312***
	Interest	25	3.52	1.36	4.68	1.65	2.7948**
	Composite Creativity	25	14.16	4.41	14.92	4.24	0.7978

Table 21.1: continued

Grade	Measure	Number	Pre-Test Means	Pre-Test St. Dev.	Post-Test Means	Post-Test St. Dev.	T-ratio
5	Originality	25	14.68	6.38	14.60	6.30	-0.0783
	Interest	25	4.28	1.59	5.76	2.05	3.0396***
	Composite Creativity	25	17.08	3.57	15.40	5.40	-1.8913*
6	Originality	22	17.23	7.47	19.41	6.12	2.1511**
	Interest	22	5.68	1.36	6.95	1.13	4.9645***
	Composite Creativity	22	17.23	4.73	15.59	6.12	-0.9991

* Significant at better than the .10 level
** Significant at better than the .05 level
*** Significant at better than the .01 level

the third grade showed rather marked improvement on all three of the criteria. The fourth graders started at a higher level and ended at a higher level on both the originality and interest measures. Both of these gains were still significant, however, at the .05 level or better. The fifth graders showed losses on both originality and the composite index of creativity but showed significant gains on the interest measure. The sixth graders showed statistically significant gains on originality and interest but a slight loss on the composite index of creativity. It must be noted, however, that the mean pre- and post-test scores of these pupils are unusually high in comparison to other sixth grade groups.

These results become more meaningful when we compare them with a control group composed of fourth, fifth, and sixth graders in two other schools. From the data presented in Table 21.2, it will be noted that the control group showed generally rather regressive trends rather than gains and the loss on interest was statistically significant at the .01 level.

Table 21.2

Means of Originality, Interest, and Composite Creativity Scores of Pre- and Post-Training Stories by Control Groups in Two Schools and Test of Significance of Difference

Measure	Number	Means Pre-test	Means Post-test	t-ratio	Level of Signif.
Originality	102	9.49	9.06	-0.956	NS
Interest	102	4.45	3.88	-3.944	<.01
Composite Creativity	102	14.28	14.63	0.788	NS

Table 21.3 presents a record of the number of contributions made by each of the four grades. It will be noted that the third grade contributed the largest number of items and that the fourth grade contributed the smallest number. The difference in percentages between the third and fourth grades is significant at the .01 level. The difference in percentage between the third and all other grades combined is significant at between the .05 and .10 level and the differences between the fourth grade and all others is significant at the .01 level. Again, this reflects the tendency of fourth graders to show a drop in creative activities.

Table 21.3

Record of Contributions to "Ideas of the Week" by Grade

Grade	Number	Per cent of Possible Number
3	86	57.3
4	53	35.3
5	62	41.3
6	74	49.3

Discussion

The data which have been presented indicate that only in part did the procedures described in this chapter achieve their objectives of helping children learn to value their ideas and improve the creative qualities of their writing. In the case of the regression shown by the fifth grade, it is reasonably certain that the failure was due to negative reactions to over-editing. During the first few weeks of the project, many of these fifth graders produced some tremendously creative stories, poems, and inventions. Even on the pre- and post-writing measure many of them also showed sizeable gains. The general trend, however, was downward. In the interviews, however, there were at least subjective indications that these children, too, came to value their ideas. In fact, they resented the fact that others did not seem to value them to the degree that they deserved.

For most of the subjects this seemed to be a new experience and through it they gained a new concept of the meaning of creative writing. The editor was somewhat taken aback by one fourth-grade boy who assured her that he was an "old hand" at creative writing. He reported, "We do it all the time in our class. In fact, it takes so much of my time that I didn't have a chance to write very often for Ideas of the Week. You see, we have to spend our time filling in the blanks in our language workbooks. And it takes the rest of my spare time to write on the blackboard 500 times, 'I will not giggle in German class,' or 'I will not run in the halls.'"

Quite interestingly the third graders seemed to respond more favorably to the experimental procedures than any other class. This was of special significance to the research team, since a tentative decision had been made not to include the third grade in the study. A discussion with the third-grade teacher, however, indicated that she felt that these third graders were ready for such an experience and would profit from it. It will be recalled that they contributed a larger number of items and that they made substantial gains on the three criterion measures of creative qualities.

Summary

Pupils in grades three through six (totaling 100) in one elementary school were encouraged to develop the habit of writing down their ideas over a period of six weeks. At the end of each week, the experimenters visited each classroom and asked that each pupil select one of the ideas from his collection envelope (idea bag) for possible use in a weekly magazine produced by the research staff. The magazine was named Ideas of the Week by participants in the study and was issued on Thursday during each of the six weeks of the study. At the beginning and end of the study, each pupil wrote an imaginative story. About one week after the end of the experiment, each pupil was asked to fill out a brief questionnaire giving his reactions to the experience and each pupil was interviewed about three weeks later by the editor of the magazine. The writings submitted were scored on the scales used in the other creative writing studies already described.

It was found that children in grades three through six can be stimulated to do a great deal of writing on their own, outside the school curriculum. Ninety per cent of the subjects of this study made one or more contributions. Third graders were highest in productivity and showed significant growth in creative writing as measured by pre- and post-training stories. The fourth and sixth grades also showed growth on two of the three measures. The fifth grade, however, showed fairly regressive trends. In the interviews, a majority of the pupils reported that their ideas occurred to them in school, usually during the arithmetic or reading periods. They also reported that their ideas came in parts or stages. In grades three through five, the majority did their writing in school -- after assigned work had been completed, at lunch time, or during recess. Pupils in the sixth grade, however, showed a definite tendency to do their writing at home. During the early stages, the subjects reported that they sought "evaluation" from outside sources and that the "final copy" was circulated to others for praise and assurance that "it's suitable" and "good enough" for submission. Teachers and parents were sought for evaluation on grammar and punctuation, but praise and encouragement were sought from peers of the same sex and grade. There were many scattered evidences that most of the subjects learned to value more highly their own ideas and those of their peers than they had prior to the experience. They resented most the evaluation represented by minor editing of the items selected for inclusion in the magazine and felt that this was a disavowal of the value of their ideas.

Chapter 22

EVALUATIVE ATTITUDES AND THE DEVELOPMENT OF NEW IDEAS

Two opposing points of view concerning the role of information in the production of original and valuable ideas predominate in the literature. Some maintain that the more information a person has the better is his chance to form new combinations of ideas and thus produce new or original ideas. Others maintain that the possession of information incapacitates a person for the production of new ideas and that one should cultivate a kind of naiveté in order to create new ideas. Out of my observations of children and of graduate students in trying to produce original ideas, it has seemed to me that these two apparently opposing points of view had been causing us to ask the wrong research questions. I began to wonder if the real answer might be found in an examination of a person's attitudes towards the information he possesses. This question itself has many facets and in the study to be described herein an attempt is made to examine only one of them -- whether a critical or a constructive attitude towards information is more helpful in the development of new ideas.

Considerable attention has been devoted in higher education to the development of critical thinking. In developing a scientific orientation among graduate students we characteristically require them to examine research reports in professional journals with a critical attitude. In their own research, however, these students are expected to be "original" or "creative."

Sensitivity to deficiencies is generally accepted by students of creativity as an important aspect of creative work, especially in the sciences. Guilford and others (1951), for example, include sensitivity to deficiencies as a factor in creative thinking. Rossman (1931), in studying the psychology of inventors, concluded that the non-inventor tends to "cuss" the deficiencies of his environment, whereas the inventor engages in constructive criticism of the "this-is-the-way-to-do-it" variety. Pepinsky (1959) has hypothesized that creative individuals express their criticism in a constructive and depersonalized way. Many students in the field (Clark, 1958; Rossman, 1931; Russell, 1956) have stressed the importance of an individual's placing value on his own ideas and on his own perceptions and experiences as means of learning.

Thurstone (1952) pointed out that although it seems proper to encourage students to be critical in reading the research literature, the cultivation of a critical attitude has certain disadvantages. He explained that often students in reviewing a piece of research assume that their task is to tear it to pieces and make the investigator or author look as foolish as possible. The trouble is that their appraisal stops there. Thurstone suggested that it might be better to have students review research about which they are enthusiastic. They would then pay attention to what the investigator was really trying to do, what he actually did, and how far he succeeded. He also suggested that students might be encouraged to suggest what they would have done with the same problem. In these ways, students' reactions to the research literature would be constructive and students receiving such practice would have less difficulty in formulating and selecting ideas for their own investigations.

Between the preliminary publication of the study described herein and the preparation of this chapter, a number of investigations have been inspired at least in part by the present study. One of the most pertinent is an experiment conducted by Hyman (1960) at the General Electric Company. Hyman's experiment was conducted to provide information on how prior information affects creativity both on related and unrelated problems. The experimental manipulation was carried out by means of an Evaluation Task. In this task, the subject was given a set of four solutions to an Automatic Warehousing Problem -- either a Heterogeneous or Homogeneous set, to evaluate constructively or critically. Following this evaluation task, the subject was asked to provide his own solution to the Automatic Warehousing Problem as well as a solution to an entirely new problem.

The subjects in the Constructive Condition produced solutions, on both the related and unrelated problems, which were rated significantly more creative. Although the effects of the informational variable were non-significant, they suggest that the Heterogeneous Condition may have facilitated creativity on the dissimilar problem and hindered it on the similar problem.

The study reported herein attempts to evaluate experimentally the effects of having graduate students examine research reports critically compared with having them to study such reports creatively. It was hypothesized that students given experiences in examining research reports creatively would themselves produce a higher quality of "new ideas" than those having experiences in examining such reports critically.

Procedures

Subjects of the study were 100 students enrolled in Educational Psychology 159 (Personality Development and Mental Hygiene) at the University of Minnesota during the first summer session, 1959. At least one item of data is missing for two of the subjects, however. Thus only 98 subjects are included in the study.

Experimental Instructions

Subjects were assigned randomly to Conditions XA (Critical Set) and XB (Creative Set) in meeting one of the requirements of the course (the reading and analysis of research reports). The instructions for Condition XA were as follows:

"In meeting this requirement, you will select and read critically two recent (since 1950) research articles related to personality development and mental hygiene prior to July 3. You may read them from whatever journals you like. Some of the more appropriate ones are listed below:

American Journal of Orthopsychiatry
Personnel and Guidance Journal
Genetic Psychology Monographs
Journal of Genetic Psychology
Elementary School Journal
Journal of Counseling Psychology
Group Psychotherapy
Psychiatry
Sociometry
Human Relations
Journal of Social Psychology
Journal of Abnormal and Social Psychology
Mental Hygiene
Journal of Personality
Journal of Consulting Psychology

"Your report on each article should include the following:

1. A brief statement of the gist of the article -- not a comprehensive summary, just a brief statement of what was done and the major conclusions.

2. A description of the defects in the statement of the problem, its importance, the underlying assumptions, its newness, and the like.

3. A description of the defects in the underlying assumptions of the hypotheses studied, their agreement with known facts, and the like.

4. A description of defects in the procedures for collecting and analyzing the data, selection of sample, size of sample, methods and instruments of data collection, techniques of analysis, reporting of data, and the like.

5. A description of defects in conclusions, interpretation of findings, implications of the findings, appropriateness to actual situations, and the like.

6. A critical appraisal of the general worth of the article to knowledge concerning personality development and mental hygiene."

The instructions given under Condition XB were identical except that subjects were instructed to read the two research articles imaginatively rather than critically, with the following instructions for preparing their reports:

"Your report on each article should include the following:

1. A brief statement of the gist of the article -- not a comprehensive summary, just a brief statement of what was done and the major conclusions.

2. A brief statement of new possibilities suggested by the statement of the problem, possible consequences stemming from its solution, other assumptions and theoretical rationales which might have been brought to bear on the problem, and the like.

3. A listing of other possible hypotheses related to the problem, known facts which might have been used in sharpening or modifying hypotheses, and the like.

4. A description of improvements which might have been made in the procedures for collecting and analyzing the data, selection of samples, methods and instruments of data collection, techniques of analysis, reporting of data, and the like.

5. A description of other possible conclusions, interpretations of the findings, implications of the findings, analogy to situations with which you are familiar, and the like.

6. An appraisal of the possibilities stemming from the findings and the extent to which the research reported represents a step forward in knowledge in personality development and mental hygiene."

Reports were evaluated and the results used in determining final grades (approximately 5 per cent of the total points possible).

The "New-Idea" Project

As a part of the course requirements, each subject was expected to develop an original idea, theory, or hypothesis concerning personality development or mental hygiene. Instructions given in the course syllabus for this project are as follows:

"First, think of as many new ideas as you can about some aspect of personality development and mental hygiene which particularly interests you. If possible, you should select some problem about which you can become fully absorbed. Jot down ideas as they occur to you. After two or three weeks, select the idea which appeals to you most and develop it more completely. Your report should describe how the idea occurred to you, why you think it is true or "would work," how it might be tested further, and what consequences it might have."

The deadline for submitting this project was the last session of the course, whereas the deadline for the reading reports was at the time of the mid-term evaluation.

Each project was evaluated on a ten-point scale for each of ten criteria. Five of these were adapted from the criteria of "inventivlevel" as defined in U.S. patent law (McPherson, 1956). The other five were related to the completeness and adequacy of the presentation of the idea. The five criteria adapted from U.S. patent law are:

1. Qualified intellectual activity or creative strength used in solving the problem.
2. Usefulness of the idea, if executed or found tenable.
3. Step forward or advance over present knowledge and/or practice.
4. Originality or newness in overcoming a special difficulty.
5. Surprisingness, remarkableness, etc.

The following points were judged in regard to completeness and adequacy of the presentation of the idea:

1. Statement of the idea.
2. Description of the development of the idea.
3. Statement of its rationale.
4. Statement of possible procedure(s) for testing the idea.
5. Prediction of possible consequences of idea.

Satisfactory inter-scorer reliability was obtained between the two judges. Only in three or four cases was it necessary to arbitrate differences between the two scorers. At the time the scoring was accomplished, the judges had no knowledge of the experimental condition to which subjects had been assigned.

Analysis of Data

Although subjects were assigned to Conditions XA and XB randomly, a further check on the equivalency of the two groups was made by comparing their mean scores on the pre-test of "Creative Thinking in Mental Hygiene" developed by the author for use in this course. A mean of 56.4 was obtained for the 53 subjects in Condition XA and 54.6 for the 45 subjects in Condition XB. The difference is not statistically significant. Thus, we may assume that the two groups were initially equivalent in their ability to do creative thinking in the field of mental hygiene. In fact, the insignificant difference which exists is in favor of Condition XA.

Means on the Creativity projects were computed and compared by means of the *t* test.

Results

A mean of 74.66 was obtained for the 53 subjects in Condition XA on the creativity project compared with a mean of 80.33 for the 45 subjects in Condition XB. A *t* ratio of 2.57, significant at between the .01 and .02 level, was obtained. The results thus support the hypothesis that subjects given experience in examining research reports creatively will themselves produce "new ideas" of higher quality than will those having experiences in examining such reports critically.

Discussion

The need for replicating this experiment in other courses and under a variety of conditions are of course obvious. The results reported herein, however, do indicate that giving students experience in reading and analyzing creatively research reports in professional journals may be useful in aiding students to develop "new ideas" of their own. Apparently the rejecting or negative set induced by reading and analyzing research reports tends to inhibit students in their efforts to think of "new ideas". The results obtained in the present study are all the more remarkable because some of the subjects resisted the assumption of the assigned set and some of the reports gave no evidence of either creative or critical thinking.

Summary

It was hypothesized that students given experiences in examining research reports creatively would themselves produce "new ideas" of higher quality than those having experiences in examining such reports

critically. One hundred graduate students in Educational Psychology 159 (Personality Development and Mental Hygiene) were assigned randomly to Conditions XA and XB, critical and creative sets respectively. The reports on the research reports were completed by the end of the first half of the course and the "new-ideas" projects were completed during the second half of the course. The "new-ideas" projects were evaluated on five criteria of inventivlevel and five criteria of completeness and adequacy of presentation.

No statistically significant differences were found between the means of subjects in Conditions XA and XB on a pre-test of "Creative Thinking in Mental Hygiene," the insignificant difference being in favor of Condition XA. On the "new-idea" projects a mean of 74.66 was obtained for subjects in Condition XA and one of 80.33, for those in Condition XB. This difference is significant at between the .01 and .02 level ($\underline{t} = 2.57$). Thus, the original hypothesis is supported by the results and it appears that experience in reading and analyzing research reports creatively is an aid in developing "new ideas" of one's own.

Chapter 23[1]

EVALUATIVE ATTITUDES OR SETS AND DIFFERENT KINDS OF EDUCATIONAL ACHIEVEMENT

Both the study described herein and the one described in the preceding chapter were motivated by a desire to find ways of helping teachers develop the skills and attitudes which will enable them to apply creatively scientifically developed information about personality development and mental health. In experimenting with various ways of accomplishing this goal, the senior author was puzzled to find that many, perhaps most, students did not have the expectation that such information could be useful in solving personal and professional problems.

The shocking realization that students enrolled in a graduate course in mental hygiene (most of them experienced teachers, counselors, and administrators) did not even expect to be able to use the knowledge they were acquiring led the senior author to experiment with different ways of establishing appropriate "sets" or attitudes. The results reported in Chapter 22 stimulated him to extend such efforts in the direction of establishing evaluative "sets" or attitudes in reading textbook material.

The effect of appropriate preparatory sets in facilitating learning has been well established (Johnson, 1955, p. 77). Usually a person's activities are integrated and he does not react to every event that stimulates his sense organs. He is selective not only of what he responds to but in what is produced and in the mental operation used in responding.

In designing the present experiment, the authors have been guided by Guilford's model of human intellect (Guilford, 1959a). Particular attention has been paid to the five mental operations: cognition, memory, convergent thinking, divergent thinking, and evaluation.

In this experiment a deliberate attempt was made to establish sets which would result in emphasis on the memory, evaluation, and divergent thinking (creative) operations. An attempt has also been made to study the extent to which students can adopt these sets, their reactions to the experience, and the resulting effect on different kinds of test performance or educational achievement.

Procedures

Subjects

The subjects were 115 students in a graduate-level course in Personality Development and Mental Hygiene at the University of Minnesota during the summer of 1960. Seventy-six are male and 39,female. As to professional background, 52 were teachers at the secondary level, 15 elementary school teachers, 13 school administrators, 10 counselors and school psychologists, 6 special teachers, 4 college teachers, and 5 public health nurses, and 10 with no professional experience in education. The average number of years of professional experience was 6.6 years, ranging from 0 to 30 years.

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[1] This chapter is co-authored with Judson A. Harmon. A portion of this material has been published previously in the Journal of Educational Psychology, 1961, 52, 207-214.

Subjects were assigned alphabetically to one or another of three groups (1, 2, or 3). The group number signified the reading set to be followed during a period of one week. This method of assignment to groups resulted in no biases due to sex, professional field, or number of years of professional experience. Some members of the original sample cancelled the course or otherwise failed to participate in certain phases of the experiment, making the size of the three groups slightly unequal.

Description of the Reading Sets

The descriptions of the memory, evaluation, and creative application sets as given to students are as follows:

Set A. Memory

When you read, it is important that you read with a set or intent to remember everything that you read. In reading your assignments for the next three days, practice using this set. Try to make your mind act as a "sponge" and "soak up" as much as possible whatever you read. Use whatever devices you like for trying to remember what you read. It may take some practice before you are really successful in assuming this set, but do not be discouraged. By the third day, you should find it easy to assume this set.

Set B. Evaluation

When you read, it is important that you think about what you are reading and evaluate critically the content. In reading your assignments for the next three days, practice using this set. As you read, ask: "Is what the author is saying really true? Does what he is saying agree with what I have experienced? Does what he is saying agree with what is known through scientific research?" Try to find defects in the reasoning of the author, in his factual presentation, and the like. Do not be concerned about errors in grammar, punctuation, sentence structure, and the like. It may take some practice before you are really successful in assuming this set, but do not be discouraged. By the third day, you should find it easy to assume this set.

Set C. Creative Application

When you read, it is important that you think about the many uses of the information which you are reading. It is especially important that you think of the various ways in which the information could be used in your personal and professional life. In reading, do not just ask, "What is the author saying?" Also ask, "How can I use what the author is saying?" Do not stop with just one use. Think of as many uses as you can of the important ideas presented. Jot down some of these uses for future reference. It may take some practice before you are really successful in assuming this set, but do not be discouraged. By the third day, you should find it easy to assume this set.

Experimental Procedure

At the beginning of the first experimental week, subjects received reading set instructions in accord with the group to which they had been assigned. Each subject received only one set during any one week. Thus, during the first week, subjects in Group 1 received Set A; those in Group 2, Set B; and those in Group 3, Set C. During the second week, subjects in Group 1 received Set B; those in Group 2, Set C, and so on.

Each week each subject was provided an "Evaluation of Reading Set" form upon which he was asked to report, among other things, the degree to which he had been able to maintain the assigned set, the degree of difficulty experienced in using that set, the number of minutes spent in completing the reading assignment for the last day of the week, and semantic reactions to the experience. The following polar-adjective pairs were used in obtaining semantic reactions: good-bad, pleasurable-painful, labored-easy, wise-foolish, active-passive, fast-slow, cautious-rash, new-old, and interesting-boring. (See Appendix for form used.)

From all indications there was a sincere attempt on the part of students to adopt the assigned sets, although they reported varying degrees of success as will be seen from the results.

Each Friday, subjects were administered a 20-minute test which covered the reading assignment for that day. This test included items which were defined as: cognitive (multiple-choice), memory (fill-in-the-blanks), divergent thinking (extensions from given facts, such as uses, questions, hypotheses, etc.), and evaluation (decision-making situations and justifications of decisions). It was at this time that the "Evaluation of Reading Set" forms were collected.

Part-scores based on performance on these sub-tests were determined for all subjects and reported to each subject at the beginning of the following week. All subjects had opportunities to use each reading set once and were administered each of the three tests containing items requiring the different mental operations (cognition, memory, divergent thinking, and evaluation).

The following are samples of items presumed to involve cognition:

According to a recent study by two New York scientists involving tests of physical fitness, which of the following findings was obtained?

_____ American children superior to European children.
_____ European children superior to American children.
_____ American children superior to Russian children.
_____ Russian children superior to American children.
_____ American children superior to Australian children.

Which of the following is least likely to contribute to the prevention of paranoid behavior?

_____ Training in straight thinking.
_____ Fostering attitudes of good sportsmanship.
_____ Finding available objects to blame.
_____ Developing self-ennobling attitudes toward sex.
_____ Facilitating social interaction.

The following are examples of the memory items:

According to Wang, the primary factor in personality maladjustment is either ________ or ________ of the child's need for parental affection and sympathetic handling.

The experimenter who used a mechanical mother in laboratory studies at the University of Wisconsin is ________.

The following illustrate the creative-application problems:

If hunger needs are not satisfied during childhood, how is this likely to affect personality development? Assume that the child has been given enough food for subsistence but rarely enough to satisfy hunger. What kind of adult personality would you expect?

Research has shown that the lower socio-economic individuals have limited ability to delay gratification. List as many ways as you can think of for using this information in educational situations to promote healthy personality adjustment.

The following is a sample of the evaluative problems:

Assume that you are a member of the controlling board of the Minneapolis General Hospital which is considering the establishment of a children's psychiatric unit for mentally disturbed children. The treatment program will be quite similar to that described in the text for the Children's Psychiatric Unit at the University of Michigan and it is estimated that the cost of treatment per child will be $6,500. In deciding this issue, how would you vote?

___ Yes ___ No

How would you justify your vote? Cite as many sound reasons as you can.

Analysis of Data

Analyses of variance were computed, comparing the effects of the reading sets on each of the different kinds of test performance (cognitive, memory, divergent thinking, and evaluation) for each of the three weeks. The evaluative type item, unfortunately, was used in only one of the tests. Analyses of variance were computed for success in maintaining set, difficulty in maintaining set, number of minutes spent in completing the reading assignment, and each of the nine semantic differential scales for the three sets. Analyses of variance were also computed on test scores by weeks and for weeks by groups in order to determine relative performance by weeks and by groups.

Results

Test Performance and Sets

The data comparing scores on the memory-type items are presented in Table 23.1. It will be noted that only during the third week were the differential effects of the three sets statistically significant at the .05 level of significance or better, the memory set producing the highest score. The predicted trend occurred during the second week but was not statistically significant.

Table 23.1

Comparison of Effects of Three Reading Sets on Performance on Memory Types of Tests (Completion) for Each of Three Weeks

Week	Reading Set	Number	Mean	Between Sum Sq.	Within Sum Sq.	F-ratio	Level of Signif.
First	Memory	40	6.04				
	Evaluative	38	6.24				
	Creative	36	5.78	3.9259	195.7898	2.226	ns
Second	Memory	33	7.32				
	Evaluative	41	6.65				
	Creative	37	7.20	9.8958	420.2684	2.543	ns
Third	Memory	38	8.30				
	Evaluative	34	8.15				
	Creative	40	7.54	12.7482	405.2544	3.429	<.05

Table 23.2 presents the means and analysis of variance data for scores on the Creative-Applications or divergent thinking items. It will be noted that the differential effects are rather strong for each of the three weeks and that in all cases those working under the creative set achieved the highest mean score. Those using the evaluative set consistently achieved the next highest mean score. It will also be noted that on the third test, all three groups tended to achieve higher scores than during the earlier weeks. This is probably due to the accumulative effects of the course which emphasized creative thinking concerning the course content.

Table 23.2

Comparison of Effects of Three Reading Sets on Performance on Creative-Application Types of Tests for Each of Three Weeks

Week	Reading Set	Number	Mean	Between Sum Sq.	Within Sum Sq.	F-ratio	Level of Signif.
First	Memory	40	4.25				
	Evaluative	38	5.43				
	Creative	36	6.18	72.4602	643.6542	12.496	<.01

Table 23.2: continued

Week	Reading Set	Number	Mean	Between Sum Sq.	Between Sum Sq.	F-ratio	Level of Signif.
Second	Memory	33	4.45				
	Evaluative	41	4.94				
	Creative	37	7.96	262.6431	372.4977	76.1493	<.01
Third	Memory	38	6.88				
	Evaluative	34	8.37				
	Creative	40	8.60	66.2446	524.4794	13.7631	<.01

The data concerning performance on the evaluative or decision-making item for the second week are shown in Table 23.3. The differential effects are statistically significant, with the evaluative, creative, and memory sets ranking in that order. Although this type of item was used at other times during the course, the only test containing such an item was the one for the second week.

Table 23.3

Comparison of Effects of Three Reading Sets on Performance on Evaluative (Decision-Making) Type of Test for Second Week

Reading Set	Number	Mean	Between Sum Sq.	Within Sum Sq.	F-ratio	Level of Signif.
Memory	33	5.88				
Evaluative	41	7.34				
Creative	37	6.70	39.1292	368.4517	11.469	<.01

Table 23.4 presents the data for the recognitive items for each of the three tests. It had been anticipated that subjects using the memory

Table 23.4

Comparison of Effects of Three Reading Sets on Performance on Recognitive Type of Tests (Multiple-Choice) for Each of Three Weeks

Week	Reading Set	Number	Mean	Between Sum Sq.	Within Sum Sq.	F-ratio	Level of Signif.
First	Memory	40	6.21				
	Evaluative	38	6.52				
	Creative	36	6.33	1.9062	236.9290	0.893	ns
Second	Memory	33	4.03				
	Evaluative	41	3.32				
	Creative	37	3.43	10.3007	200.9297	5.537	<.01
Third	Memory	38	4.68				
	Evaluative	34	5.06				
	Creative	40	4.42	7.3804	211.8738	3.797	<.05

set would perform best on these items. This occurred only during the second week, however. The differential effects were also significant for the last test, but subjects working under the evaluative set achieved the highest mean score. It will also be noted that subjects using the evaluative set also had a slight edge during the first week but the differential effects were not statistically significant.

Other Reactions to Assigned Sets

Failure to maintain an assigned set is obviously important in determining the effectiveness of a set in producing the desired results. Two questions on the "Evaluation of Reading Set" form were designed to supply information concerning this problem. Responses concerning the completeness with which the set was maintained ranged from "not at all" (point 1) to "almost all of the time" (point 7). Responses concerning difficulty in learning to use the set ranged from "impossible" (point 1) to "extremely easy" (point 6). Weights were assigned arbitrarily. Means and F-ratios are presented in Table 23.5 for success in using set, difficulty in using set, number of minutes spent on reading assignment for day, and for each of the semantic scales.

Table 23.5

Comparison of Effects of Three Reading Sets on Success in Using Set, Difficulty in Using Set, Time Spent on Reading Assignment, and Semantic Reaction for Three Weeks combined

Variable	Memory		Evaluative		Creative		F-ratio
	Number	Mean	Number	Mean	Number	Mean	
Success in using set	106	5.18	109	4.06	105	3.79	63.35*
Difficulty in keeping assigned set	106	4.54	110	4.10	105	3.97	26.72*
Number minutes spent on reading assignment	104	112.27	110	114.52	105	112.00	0.23
Good-Bad	105	2.47	109	2.92	102	2.59	0.59
Pleasurable-Painful	103	3.08	107	3.16	103	3.01	0.87
Labored-Easy	103	3.96	107	3.64	103	3.73	2.44
Wise-Foolish	103	2.45	109	2.37	102	2.36	0.30
Active-Passive	103	2.64	107	2.67	102	2.48	1.46
Fast-Slow	102	3.96	107	4.38	103	4.33	5.02*
Cautious-Rash	102	2.86	107	2.97	102	3.13	3.27**
New-Old	103	4.55	107	3.64	103	2.88	18.38*
Interesting-Boring	103	2.76	107	2.25	102	2.13	17.11*

* Significant at .01 level
** Significant at .05 level

From Table 23.5 it will be noted that the sets had significant differential effects on both success and difficulty in using set but not on time spent on reading assignment. The memory set seems to have been the most successfully and easily maintained and the creative set seems to have been the least successfully and easily maintained. Subjects estimated that they maintained the memory set on the average about two-thirds of the time, finding it between "fairly difficult" and "fairly easy" to maintain. They reported that they were successful in using the creative set less than half of the time, estimating the difficulty between "very difficult" and "fairly difficult."

From Table 23.5 it will also be noted that only on four of the nine polar-adjectives are reactions significantly different statistically: fast-slow, cautious-rash, new-old, and interesting-boring. Subjects using the memory set, tended towards fast, cautious, old, and boring. Those using the evaluative set tended towards slow and hit a middle position on the others. Under the creative set, the direction was towards rash, new, and interesting.

Effects by Weeks

To determine whether or not there are differential effects according to weeks another set of analyses of variance were computed. The results are presented in Table 23.6. It will be noted that during the second week

Table 23.6

Comparison of Effects of Three Weeks on Success in Using Set, Difficulty in Using Set, Time Spent on Reading Assignment, and Semantic Reaction for All Sets Combined

	Memory		Evaluative		Creative		
Variable	Number	Mean	Number	Mean	Number	Mean	F-ratio
Success in using set	112	3.93	102	4.68	106	4.46	15.84*
Difficulty in keeping assigned set	113	4.22	102	4.22	106	4.17	---
Number minutes spent on reading assignment	112	111.37	102	118.92	105	108.86	3.26**
Good-Bad	110	2.60	101	2.69	105	2.70	0.36
Pleasurable-Painful	110	3.08	99	3.03	104	3.13	---
Labored-Easy	109	3.77	101	3.78	103	3.78	---
Wise-Foolish	110	2.28	100	2.54	104	2.38	1.09
Active-Passive	109	2.48	99	2.73	104	2.61	2.18
Fast-Slow	110	4.54	99	4.26	103	4.05	5.86*
Cautious-Rash	109	2.91	99	3.02	103	3.04	0.94
New-Old	110	3.60	99	3.67	104	3.82	0.83
Interesting-Boring	110	2.22	100	2.35	105	2.57	4.62*

* Significant at .01 level
** Significant at .05 level

subjects tended to report greater success in maintaining the sets than during the other weeks. They also tended to spend somewhat more time on the reading assignment during this week. Only on the Fast-Slow and Interesting-Boring semantic scales are there differential effects. There was a consistent drift towards fast and boring.

Test Performance by Group and by Week

Analyses of variance were also performed to study differential test performance by group and by week. The means by group and week are shown in Table 23.7 and the analysis of variance data are presented in Table 23.8. It will be seen from Table 23.8 that the effects for groups are

Table 23.7

Mean Scores of Groups by Weeks and Week by Groups on Test Performance

Week	Means			Mean for Week
	Group 1 (N = 38*)	Group 2 (N = 35)	Group 3 (N = 35)	
First	22.566	24.071	24.514	23.685
Second	22.000	25.229	21.614	22.921
Third	29.513	28.314	29.300	29.056
Mean for Group	24.693	25.871	25.143	25.221

* All subjects for which there were any missing data were elminated from this analysis

Table 23.8

Analysis of Variance Data to Study Effects of Groups and Week on Test Performance

Source of Variance	Sum Squares	Degrees Freedom	Mean Squares	F-ratio	Level of Signif.
Between Subjects	4663.64	107			
Groups	76.54	2	38.42	0.88	ns
Error	4586.80	105	43.68		
Within Subjects	5742.33	216			
Weeks	2413.93	2	1206.97	84.70	<.01
Groups x Weeks	307.70	4	76.92	5.40	<.01
Error	3020.70	212	14.25		
TOTAL	10405.97	323			

not statistically significant and that the effects for weeks is statistically significant but that there are significant interaction effects. From Table 23.7 it will be noted that all groups tended to achieve higher scores during the final week. Although Group 2 which began with the evaluative set achieved the highest overall mean, each group had its turn at holding a slight lead.

Discussion

From the data which have been presented it seems clear that instructing mature students to assume various reading sets will have differential effects on the kind of goals achieved. This would seem to be especially true if creative thinking and evaluative thinking are desired as outcomes. Although the students in the present study were able to maintain the creative and evaluative sets only about half of the time, attempts to maintain these sets had measureable effects on performance on tests covering the reading assignment.

Since most examinations administered to large classes are of the recognitive (multiple-choice) type, it is worthwhile to note that the memory set does not uniformly result in the best performance on this type of test. In fact, in only one of the three weeks does the memory set result in superiority on the recognitive type of test. The evaluative set tended to result in better mean scores during the other two weeks, although the differential effects were not statistically significant during the first week.

Because of the differential effects of the three reading sets on the four types of tests, one might also infer that instructors need to develop tests designed to measure different kinds of achievement, depending upon course objectives. If instructors expect their students to think imaginatively and evaluatively about what they learn, it is extremely doubtful that such goals are adequately assessed by the traditional multiple-choice and completion items.

The data indicate that students are more successful in maintaining the memory set and find it easier to maintain this set than the creative and evaluative sets. This probably results from the fact that they have had much more practice in maintaining the memory set than in using the others. This hypothesis receives some support from reactions to the semantic differential. For example, subjects under the memory set tend to rate the experience in the direction of cautious, old, and boring. It is likely that with practice students will find it easier to maintain creative and evaluative sets and that even better results will be achieved than those reported herein.

From the analyses by groups, it would seem that no particular sequence for assigning sets has advantage over another. No special significance can be attached to the results showing differential effects by weeks, since the possible number of points varied from week to week.

In interpreting the results, it should be recognized that the subjects are graduate students and that almost all of them have had rather extensive experience in various types of educational work.

Summary

This experiment was designed to test the differential effects of memory, evaluative, and creative "sets" in reading assignments in a graduate level course on Personality Development and Mental Hygiene. The 115 subjects were arranged alphabetically and assigned to one of three groups. Each group was assigned in turn each of the three reading sets to be used in the assigned readings for a week. At the end of each week, a 20-minute test containing recognitive, memory, creative thinking, and evaluative items was administered. Subjects also estimated their degree of success in maintaining the set, difficulty in maintaining it, the number of minutes spent on the Friday's reading assignment, and their semantic reactions to nine polar-adjective pairs.

Analyses of variance indicated that the three sets produced differential effects on most of the tests for all three weeks. Those operating under the creative set, achieved the highest mean each week on the creative applications. Those operating under the evaluative set achieved the highest mean on the evaluative or decision-making problem when such a problem was given (second week only). Those operating under the memory set achieved the highest mean on the memory tests (completion) only during the third week. The differential effects on the memory items were not statistically significant during the other weeks. Differential effects on the recognitive items were not consistent. Those operating under the memory set achieved the highest mean during the second week and those under the evaluative set led during the third week.

Subjects reported that they found it easier to maintain the memory set and rated themselves as more successful in maintaining this set than the other two. There were no differential effects on the estimated length of time spent on the reading assignment. On the semantic differential, subjects under the memory set tended towards fast, cautious, old, and boring. Those under the evaluative set tended towards slow and those under the creative set, towards rash, new, and interesting.

During the second week subjects generally reported greater success in maintaining sets than during the first and third weeks. On the semantic evaluations, there was a consistent and significant drift towards fast and boring. The three original groups did not differ significantly, giving no evidence of the superiority of any one sequence of sets over the others.

Chapter 24[1]

REWARDING SELF-INITIATED LEARNING

A concept of education structured around a bookkeeping system of courses, credits, and grades has been a deterrent to the provision of opportunities for self-initiated learning. This has been particularly true in secondary and higher education where graduation depends upon the completion of a certain number and combination of units or credits, and where rewards depend upon grades achieved in these units or credits. Self-initiated learning has scarcely been less impeded in the elementary school years, due perhaps to the concept that the curriculum should be the same for all children and the teacher's fear that any time used in pursuing the questions and problems initiated by children would make it less possible for them to "cover the curriculum" and to develop required skills in arithmetic, reading, language, and the like.

With the explosion of knowledge and stepped-up rates of change experienced in recent years, educators have begun to reassess the role of self-initiated learning. Many of them have begun saying that one of the goals of education should be to help children and young people acquire the motivations and skills to continue learning for the rest of their lives. This point of view has already been expressed in greater detail in earlier chapters. As early as 1957, the Educational Policies Commission of the National Educational Association recommended that more effort be exercised "to appraise and credit growth resulting from a student's own initiative" (p. 54).

Many reasons can be cited for giving a place of greater importance in education to self-motivation and the development of skills for learning on one's own. Tead (1958) justified such an emphasis on the prospect that in the future there will be more students per teacher and that there will be an increasing practical mandate that students continue into adulthood their drive to acquire operational knowledge and to handle their leisure with productive resourcefulness. Tead (1958, p. 28-29) argues that the acquisition of subject matter need not be sacrificed in giving opportunities for self-initiated learning, since subject matter is always learned in the process of learning to learn and liking to learn. Tead himself, however, values such indirect and by-product learnings as esthetic appreciative power, skill in oral and written communication, a life outlook which helps to integrate and give spiritual substance to one's career, a capacity for affection, and the like. He believes that colleges should promote whatever knowledge, skills and feelings that will yield a capacity to cope with life with zest, goodwill, reason and growing awareness. He argues further that experience has shown that under wise guidance the various methods of encouraging independent study (broader reading, extended theses on major projects, and the like) lead to more sustained, thorough, and self-prompted learning than do the traditional lectures and recitations.

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[1] I am indebted to Judson A. Harmon and Donald Jack Davis for assistance in preparing this chapter.

Some of the recent studies of acknowledged creative persons who have made outstanding scientific, literary, artistic, and other contributions to society also present a strong case for providing more opportunities for self-initiated learning and for rewarding achievement which results from such efforts. In her study of eminent scientists, Anne Roe (1952) found that what decided almost all of her subjects on their career was a college project in which they were given freedom to find out things for themselves and once the joys of freedom were tasted, they never lost the zest. Roe concluded that the most important single factor in the making of the creative scientist is the need and ability to develop personal independence to a high degree. This independence factor is emphasized by numerous other findings in Roe's studies -- her subjects' preference for teachers who let them alone and their satisfaction in a career in which, for the most part, they follow their own interests without direction or interference.

Other studies (MacKinnon, 1962; Goertzel and Goertzel, 1962; Compton, 1953) of eminent creative scientists yield similar indications. Compton reports that one of the most pervasive characteristics of the Nobel prize winners is their exceptional self-starting ability. He also found that they had worked under conditions of substantial freedom and leisure and in an atmosphere where the kind of work in which they are creative is recognized as important. Compton argues that it is not so much the love of knowledge as the love of adding to knowledge that is important. Among educators, Foshay (1961) argues that excellence in school requires a student to view himself as the maker of his learning.

Evaluation of the Outcomes of Self-Initiated Learning

It is rare that serious efforts have been made to evaluate the outcomes of self-initiated learning and generally the student who devotes considerable time to self-initiated learning is penalized by existing grading systems. This state of affairs seems to be reflected in the studies of Elizabeth Drews (1961b), comparing the behavior of three types of gifted high school students (creative intellectuals, social leaders, and high achieving studious individuals). The creative intellectuals achieved the lowest teacher grades of any of these groups but the highest scores on difficult scholarship examinations sampling broad bodies of knowledge and high-level skills. She found that just before examinations, the social leaders were reading for the first time materials which they knew would "pay off" on the examinations. The high achieving, studious youngsters were studying their textbooks, notes, and the like, as usual. The creative intellectuals were reading such things as college textbooks, philosophy, and the like. In fact, this group did far more reading than either of the other groups.

Teachers who are sensitive to what students really know and how they come by their information have long recognized the role of self-initiated learning activities. Mearns (1958), for example, noted that many children accumulate a store of knowledge from the pursuit of their collections of stamps, butterflies, and the like, as well as from the strangest reading in encyclopedias and compendiums of facts such as the World Almanac. He also noted that these intense research students in a special field often stood low in "school facts." Often, however, they knew more about equally important things of the world than their instructors, Mearns observed (p. 6).

Carnahan (1959) has made an excellent analysis of the ways in which self-initiated learning in the regular classroom is discouraged. He identified six possible types of reactions teachers make when a student requests help with some self-initiated learning activity with which the teacher does not feel comfortable. The teacher can say that he cannot help the student and let it go at that. The teacher can suggest that it would be better for the student to give attention to more conventional subjects and suggest a few of these for consideration. The teacher can recommend that the student obtain a book and read, if the teacher knows of such a book he can give as a specific reference. The teacher can agree to read and work along with the student in common pursuit of new knowledge. The teacher can put the student in contact with some person who has knowledge and will give guidance. The teacher can tell the student to forget the whole thing and attend to assigned work in school. Carnahan argues that every case of student-initiated interest in special study should be treated seriously. The teacher should make an effort to help the student see his interest in relation to the broad area of the field of knowledge of which it is a part, should help him make contact with helpful books, and should put him in contact with persons who have the knowledge and time to give assistance, and should recognize achievement in some suitable way.

Many of those who have sought to evaluate the effectiveness of self-initiated or self-directed study in relation to other methods have experienced difficulty. In general, however, the nature of the self-initiated or self-directed study experience has not been well-defined and in some cases there is doubt as to whether or not a so-called self-directed experience could, in fact, be regarded as self-initiated or even self-directed. Even at the best, however, there are always compounding variables in such complex studies. Another problem has been the lack of appropriate measurement devices for assessing outcomes. Most of the studies which have been reported used the multiple-choice, recognition type of item.

University of Michigan Studies

Guetzkow, Kelly, and McKeachie (1954) made an experimental comparison of recitation, discussion and tutorial methods in teaching psychology at the college level. By and large, they found no differences among the three teaching methods in terms of the achievement of the educational outcomes measured. In a further study, McKeachie, Lin, Forrin, and Teevan (1960) found that the conventional lecture-discussion method of teaching was superior to the tutorial method in communicating information as measured by a multiple-choice examination but there were no differences on other measures of cognitive outcomes. The tutorial students, however, were more favorable in their ratings of the course and on other motivational measures than were students under the conventional methods. Findings from a child-development course (McKeachie, 1960), however, were more favorable to independent study. Students working independently made the best scores on the final examination which measured retention of factual material in the textbook. The instructor-led discussion groups were lowest in performance on the final examination.

University of Colorado Studies

A somewhat more carefully planned and evaluated series of studies of self-directed study has been conducted at the University of Colorado (Gruber and Weitman, 1962). Separate studies have been made of such courses as Educational Psychology, General Psychology, Civil Engineering (Reinforced Concrete Design), Freshman English, Introduction to Research Methods in Psychology, Physical Optics, Culture and Personality, Physical Science (Man in the Physical World), Principles of Economics, Principles of Marketing, American Government, Chemical Engineering, and Mathematics. In these experiments, students spent only a limited amount of time in the classroom, usually one hour per week, and the remainder of the time was spent in self-directed study. Several types of evaluation were used. In most of these studies, the following four types of examinations were used:

1. Information (knowledge of subject matter). Questions asking what, when, where, who, and requiring brief, factual answers.
2. Simple applications. Tasks requiring utilization of one general principle and knowledge of a few facts.
3. More difficult applications. Tasks requiring utilization of two or more principles and fairly broad factual knowledge.
4. Learning and application of new material. New material was introduced as a part of the final examination. The students' task is to read and then apply this new material to the solution of a problem. The solution of such problems required the integration of new information with the rest of the material and skills learned in the course. In some cases, it was possible to obtain data concerning the effects of self-directed study on thinking during lectures and the persistence of effects after the completion of the course.

As might be expected (Gruber and Weitman, 1962), results varied somewhat from course to course. Of the 19 courses evaluated, 12 courses were rated favorable to self-directed study, three as neutral, and four as unfavorable. Some of the earlier experiments in educational psychology and general psychology are suggestive of some of the possibilities of intelligently planned and guided self-directed study. Two classes in educational psychology were equated with respect to aptitude. One class was taught by traditional lecture methods, three lectures per week, while the other was handled by a self-directed technique, involving only one lecture per week. While there was only a small and non-significant difference in favor of the experimental group on mastery of course materials, the results of tests ten months later were more favorable to the experimental condition. The self-directed subjects were still somewhat superior to the controls in retention of course materials and showed significantly more curiosity about educational psychology. The study was repeated in a course in general psychology with substantially the same results (Hovey, D.E., Gruber, and Terrell, 1963).

Antioch College Studies

A somewhat similar set of studies have been conducted at Antioch College (Baskin, S. and Ruth Churchill, 1961). Experiments were conducted in undergraduate courses in history, sociology, business administration, literature, philosophy, physical sciences, geography, earth sciences, design, and government. In all cases, the experimental treatment involved some reduction in the number of class meetings and lectures while the control classes met for the traditional number of class hours. In most cases, however, team meetings of students rather than independent study substituted for regular class meetings. The evaluations showed that students learned equally well whether they had studied under the regular method of instruction or under the experimental method of independent study. This held true whether multiple-choice examinations, short-answer tests, essays, or task assignments were used to evaluate the results. It held true for each year of the study and for both beginning and advanced courses. Data on retention of learning two years after completion of the course revealed no significant differences. There was no evidence that the independent study methods needed to be reserved for the superior or advanced student only. While students tended to prefer the lecture-discussion teaching, they expressed growing acceptance of and satisfaction with independent study as they become more familiar with it. The data indicate that students come to college largely unprepared for independent learning. The Antioch investigators concluded that the success of independent study methods requires that students be given a great deal of help in learning how to work on their own.

An Industrial Study

Jennings (1953) in an industrial training experiment reported a somewhat bolder approach to self-initiated learning than has been reported in higher education. In this experiment, Trainees grouped themselves and selected their problems for study. Jennings reasoned that much time is taken in the usual training session in presenting a problem and securing complete understanding of its elements (the warm-up process). By having trainees group themselves and select their own problems he hoped to save time and to reduce or eliminate resistance to the study of problems selected by the trainer or teacher. Jennings found that his procedure was more successful than earlier "standard procedures" in obtaining group agreements. Other by-products included: better attendance, livelier participation, and sessions that got off to a faster start.

Status of Knowledge

McKeachie's summary of the status of knowledge concerning independent study would appear to be as true now as in 1960. At that time he wrote: "...independent study is not a panacea, and we still know little about the types of students, teachers, previous training, or objectives are necessary for its success" (p. 354).

Self-Initiated Learning in Honors Programs

Earlier Studies

During the past thirty or more years there have been scattered and generally rather limited attempts to develop Honors Programs in higher education in the United States in such a way as to provide for some degree of self-initiated learning. In many cases, however, the requirements of a larger system based on a bookkeeping system of credits and grades has made it difficult to maintain the self-initiated element even in Honors programs. Pressey at The Ohio State University has long been an advocate of such programs and as early as 1932 began to report encouraging outcomes and in 1955 reported a brief follow-up of graduates of an Honors Program twenty years later. One interesting finding is related to the number of graduates later obtaining doctorates. Pressey found that year after year only about five College of Education graduates of a particular year ever completed a doctorate. Of nine honors graduates in Pressey's study, however, five completed doctorates, while only five of the remaining graduates of that year completed doctorates, as was true of preceding years.

Present Status of Honors Programs

There is little doubt that interest in honors programs in higher education has been greatly increased during the past ten years. One indication of this interest is reflected in a 1963 publication of the United States Office of Education entitled *Talent and Tomorrow's Teachers: The Honors Approach* (Lewis, 1963). This publication is based upon the proceedings of a 1962 conference of the Inter-University Committee on the Superior Student. This increased interest in honors programs is also reflected in the publications of the Inter-University Committee on the Superior Student, *The Superior Student*.

Self-Initiated Learning in Honors Programs

One might ask, however, how much opportunity there is in honors programs for self-initiated learning. The January, 1961, issue of The Superior Student (Cohen, 1961) was devoted to an honors inventory. This inventory is based on returns to a questionnaire sent by the Inter-University Committee on the Superior Student to those four-year institutions, public and private, for which they already had some information indicating an interest in honors programs. The schools participating were asked to indicate the specific provisions of their honors programs. The one provision which seemed to allow for self-initiated learning was "independent study" which was defined as "reading or research project for credit by individual students, apart from regular courses, with the chief responsibility placed upon the student himself." At the time the initial report was published 239 institutions had submitted reports. Of these, 134 or 56 per cent indicated that some of their honors programs provided for independent study. In two supplementary reports, an additional 49 institutions indicated that their programs made some provision for independent study, making the total 183.

In order to obtain a rather crude national picture of the extent to which self-initiated learning is encouraged and rewarded in honors programs, an analysis was made of all descriptions of honors programs appearing in The Superior Student during the five-year period from 1959 through 1963. Descriptions were available for a total of 139 honors programs. Of these, 55 (39 per cent) reported the existence of some kind of self-initiated learning. From an additional 45 (32 per cent) descriptions it could be inferred that such provisions might exist. In the remaining 39 (29 per cent) descriptions there was nothing to suggest that such provisions might exist.

Rewards for Self-Initiated Learning in Honors Courses

The reports in The Superior Student give little indication that independent study or self-initiated learning is rewarded. Only ten (seven per cent) indicate that independent study or self-initiated learning counts as a part of the student's grade. Seven (five per cent) describe some other type of reward. Amherst College reported that funds are available for the publication of small number of honors theses. At the University of Colorado, students in honors programs publish Tangent, a quarterly review devoted to creative and critical works by students in the honors program. At the University of Kansas Medical School there are research awards for self-initiated learning. In the honors program in chemistry at Northwestern University the work done in senior research is often published. At Stanford University, essays in the honors program in the humanities are sometimes published. In one of the programs at Stetson University Ford fellowship students receive a forty-dollar book allowance. At Yale University there are two prizes for honors students, one for excellence in creative writing and one for scholarly work of a scientific, historical, or critical nature.

Nature of Self-Initiated Learning in Honors Programs

From the published descriptions of honors programs, an attempt was made to determine the nature or form of the independent or self-initiated learning. Most frequently mentioned is some type of research project or thesis, not specified as original research. Twenty-four (17 per cent) of the descriptions mentioned this category. Some of these were clearly syntheses of the literature and participation in the research of faculty advisers. Fifteen (11 per cent), however, do mention some kind of original or creative research or production. Five mention what might be labeled as activity rather than research projects. Three mention the production of critical works; two, study for advanced standing examinations; one, foreign travel; and one, work for a colloquim presentation.

Values Attributed to Self-Initiated Learning in Honors Programs

An attempt was also made to survey the values attributed to independent study or self-initiated learning. The reports contain little elaboration on this point but give some clues. The following is a list of the statements concerning the values attributed to self-initiated learning:

1. Liberates the gifted student to the point at which he is capable of independent work.
2. Entry to the honors program is on a self-initiated basis -- the student makes a decision to become an independent inquirer.
3. Factors which seem to distinguish the successful honors student from the unsuccessful one were: capacity to work alone, ability to formulate problems and possible solutions independently, intellectual curiosity, and the drive to sustain one's self over tasks with a long-term goal of two or more years of study.
4. Broadens and deepens knowledge.
5. Aids in the early identification of outstanding students and has effects beyond the specific discipline of the course.
6. Provides solid grounding for advanced study leading to the doctorate.
7. Requires students to display a high degree of maturity, responsibility, and self-discipline.
8. The thrill of independent, creative thought is not limited to the professional scholar; these experiences should be a part of the truly liberal education.
9. Makes students read more and think more deeply about what they read.
10. Enriches medical education with a special interest (research problem, reading project). The continuing work of a physician, in research or in practice, requires him to study independently of coercion, patterns or schedules.
11. A long-range objective is to save resources in talent and leadership.

12. Provides invaluable preparation for more advanced work.
13. Helps to place emphasis on individuality in other areas of music study than those of performance and composition.
14. Provides for pronounced intellectual curiosity, marked initiative, and drive to carry out independent work.
15. Gives opportunity to do a sustained piece of work on a subject of own choosing.
16. Self responsibility and self-guidance are goals of the whole honors program.
17. Speeds up work of abler students by encouraging them to prepare regularly for advanced standing examinations.
18. Emphasizes individual work at an early stage and encourages greater responsibility in the student for his own education.
19. Fuller account must be taken of the student's interests and needs, his integrity as a learner, and his responsible desire for self education.
20. Students find out more about their subjects and themselves.
21. Makes undergraduate education more flexible and challenging.
22. Helps superior students become creative scientists.
23. Provides for a higher caliber of scholarship, a greater degree of critical thinking, a higher degree of respect toward academic matters, and heightened motivation among all students.
24. Tries to get students to think creatively and with imagination.
25. Helps students acquire a first-hand knowledge of the arts in Europe.

Summary

From these data, it seems clear that there are some rather widespread attempts in higher education to introduce opportunities for self-initiated learning, to reward such achievements, and to define appropriate forms for its manifestation. There are also efforts to think through more fully the values of self-initiated learning. The problem of evaluating and rewarding self-initiated learning is apparently regarded as an unsolved problem in at least over 90 per cent, if not all, of the programs described. Some specifically indicate the existence of this difficulty and others avoid the issue altogether and are silent concerning it.

What Happens in a Regular Class When Self-Initiated Learning is Credited

For several years, I have attempted to encourage my own students meeting in regular classes to engage in self-initiated learning by giving credit for relevant experiences outside the curriculum. It has been my observation that students enrolled in my courses rarely dared to investigate the questions and ideas which stimulated their curiosity during a course for fear that the time devoted to such learning would cause them to lose out in the competition with their classmates on grades. The provision for credit for self-initiated learning amounting to about

25 per cent of the grade was introduced in an attempt to reduce this inhibition about pursuing information about which students are interested and curious but not covered in textbooks and classroom presentations.

In their reports of self-initiated learnings, students are asked to describe the source of their idea or the process by which the inquiry was stimulated, the nature of the investigation, how information was obtained, how they might have improved their methods of inquiry, their plan of future action, their evaluation of the experience, and reasons for success or failure, value or lack of value. Data were available for 134 students enrolled in Educational Psychology 159 (Personality Development and Mental Health) during the summer of 1960. Over 90 per cent of these students were enrolled in the Graduate School and had had experience in educational work of some kind, ranging from pre-school through higher education.

Source of Ideas for Self-Initiated Experiences

An analysis was made of each experience reported to determine the nature of the source of the idea of the self-initiated effort to learn. The results of this analysis are as follows:

Source	Number
Some earlier life experience	80
Class lectures and discussions	67
Textbook for the course	32
Observations of children	28
Other lectures outside the course	21
Discussions with friends (outside class members)	18
Discussions with relatives	17
Books, journals, newspapers, magazines	14
Observations of adult behavior	11
Course syllabus and written exercises	10
Discussions with class members	4
Radio and TV	3
Other Textbooks	2

From these data it is apparent that once students are freed or alerted to pursue problems of personality development and mental health that a vast variety of experiences set off their investigations. Only a relatively small part of these experiences are inspired directly by the curricular experiences (lectures, class discussions, textbook readings, and the like). Their reflections on their earlier experiences account for a large number of these investigations. Other ideas come from friends, relatives, other classes, newspapers, radio, and random or casual observations of human behavior. In other words, there are intimations that students become more open to their experiences.

Content of Investigations

A list of 115 different topics was compiled from the reports of students. The following is a list of the topics which concerned ten or more students:

Topic of Investigation	Number
Author's (student's) self	105
Anxiety	10
Athletics and other skilled motor performances	17
Administration, school	11
Counseling and guidance	15
Children and adults, exceptional	13
Creativity	12
Defense mechanisms	10
Expending energy in behavior	10
Family, student's own	19
Groups	25
Goals, attitudes, beliefs and values	21
Mental illness	26
Motivation and incentives	13
Overloading and unloading	12
Occupations and world of work	12
Parent-child relationships	21
Relationship, interpersonal	32
Risking and decision-making	35
Stress	35
Society	15
Self-concepts	19
Study habits	37

Some of the more unique topics included: the aged, ambition, competition, confession, experimentation, fingernail biting, fatigue, guilt and sin, humor, leisure, maturational limits, parapsychology, praise, problem-solving, prejudices, physiology, religion, sensation, scholarships, psychotherapy, thumb-sucking, and tests and grading. Thus, it seems that when students are freed to pursue information about problems of personal interest to them that they investigate a wide variety of curricular content and thus the curriculum becomes quite different for different students.

Methods of Inquiry or Data Collection

An analysis of each reported experience was made to determine the method of inquiry or data collection with the following results:

Method	Number
Self observation, experiencing, testing	81
Logical reasoning	72
Library facilities, other printed material	70

Method	Number
Observations of and syntheses relative to student behavior (own students)	49
Course texts and lectures	30
Recollections, new syntheses of	26
Conversations (casual) and new syntheses from them	23
Interviews, formal with "experts"	22
"Life" experiments, deliberate changes in way of living	18
Notes, "idea bank," etc. or new syntheses of	9
Pilot experiments	7
Interviews with students	7
Visits to agencies, institutions, etc.	5
Questionnaire (developed by student) and original data	4
Others; dictionary, attended a lecture, took driving lessons, etc.	6

It is interesting to note the high frequency with which students used their own experiencing as a source of information and new syntheses. Some other classes were given specific encouragement to use various mental health agencies as sources of information and this became a dominant method of inquiry.

Possible Improvements in Inquiry Techniques

Since one of the aims of the course was to develop the motivations and skills necessary for continued learning, it was considered important to obtain information about student's insights into how they might have improved their chances or degree of success. The following data resulted from this analysis:

Area of Possible Improvement	Number
Interviewing: should have interviewed other informed people, been more skilled or at ease in interview	21
Sampling procedure: made observations of other times of day, week or year; made observations of other populations, attempted to control for subject bias, used a better method selecting control group	22
Controls: should have included different responses, eliminated subjectivity of experimenter, etc.	11
Statistical procedures: had more tests, used more accurate measurements, better method of recording data, used a larger number of subjects, better statistical analysis of data	14

Area of Possible Improvement	Number
Background: attended relevant professional meetings, read accounts of related procedures, been a volunteer settlement house worker, gotten a better background of problem, discussed the subject with the instructor, etc.	38
Planning: planned more systematically or stuck to plan, developed a clearer statement of the problem, given a diagnostic or pre-test, made questions easier for subject to understand	22
Broadening the study: toured the jail, hospital, etc., sent out questionnaires, considered other variables	8
Intensifying the study: conducted thoroughgoing case studies, made follow-ups, done deeper investigation of the case, etc.	13
Timing: gotten to the problem sooner, studied the problem over a longer period of time, spent more time on the study	12
Personal approaches: should have been more pressure on course assignments, taken course during regular session, studied using the creative set, taken fewer credits, taken more opportunities for recreation, had a more realistic attitude, tried to do the work on my own, asked wife for suggestions, etc.	21

From these data it appears that students do have some rather clear ideas concerning the ways in which they could have improved their inquiries.

Plans of Action Resulting From Experience

The following is a summary of the plans offered by the students for further investigation of use of the information or skills obtained through the inquiry reported:

Nature of Plan	Number
Implementation through applications in own teaching	48
Implementation through application to personal life	33
Implementation in informal study	13
Further observations	12
Further rather formal or planned studies	12
Implementation in counseling and guidance work	12
Further reading	10
Implementation in family relations	9
Be more sympathetic and understanding of student problems	6
Further experimentation	4

Nature of Plan	Number
Further interview contacts	4
Implementation in school administration	4
Further specific course work	3
Others: further general course work, self-observations, informal discussions, speaking out for mental health programs, avoiding similar predicaments, further reflection on problem, learning more about different kinds of psychotherapy, looking for causes of behavior, allowing students more freedom of inquiry, getting more recreation, being more tolerant of the problems, visiting a mental hospital, using creative (divergent) set, suggesting course for fellow teachers, reducing the number of school rules, being less emotional in financial decisions, using corporal punishment less, collecting ideas on how to teach creatively, continuing use of my "idea bank," etc.	

Whether these students followed through with their plans, they at least recognized the paths by which they could continue learning or could apply their insights.

Evaluation of the Experience

When students were asked to evaluate their experiences, some responded in terms of "success" or "failure," while others thought in terms of "valuable" or "not valuable," "satisfying" or "not satisfying." The following is a tabulation of the responses obtained:

Evaluation	Number
Successful	31
Unsuccessful	17
Valuable	91
Not valuable	2
Satisfying	12

It will be observed that in the main students valued rather highly their self-initiated experiences.

Some of the reasons given for feeling that their attempts were successful include: greater feeling of competence, personal conclusions supported by those of experts, student improvement, disappearance of problems, deeper feeling of happiness, clearer concepts, greater ease in understanding patients, wife, etc., student's rebounded from a poor performance, satisfaction of curiosity, etc. Reasons given for failure included: poor definition of concept, unfamiliarity with concept, a lack of understanding of student's problems, not being in college classes for over 10 years, poor handling of interpersonal situation, continued negativism of child, making less money than expected, continued indecision, continued intense stress, etc.

The following are some of the reasons for considering the experience valuable: better working knowledge of the subject (20), usefulness of information in teaching (19), better understanding of own behavior (16), feeling of being better informed (13), aid in study and other programs (10), better understanding of own limits (7), greater skill in interpersonal relations (6), reduction of tension (4), group discussions aroused, ability to use concepts developed in course, aid in creating a productive situation at school, less avoidance in making creative applications, etc.

Some students worked very industriously on deliberate efforts to learn on their own only to find that as the end of the course approached that their unplanned, spontaneous learning had been so important that their deliberate efforts to learn on their own looked inconsequential. In some cases, students discarded their more formal and deliberate accounts and submitted instead an account of these unplanned, spontaneous experiences which they valued far more. Such experiences are naturally difficult to analyze according to the procedures used herein. The values reflected in such accounts, however, are regarded by the author as important enough to present verbatim one such report.

> "During the past five weeks, I have been jotting down many very interesting ideas as they have occurred to me, particularly in the field of creativity. As much as I would like to pursue some of these, I feel strongly compelled to tell of another one, because of the great amount of self-satisfaction it has brought me, and because it clearly demonstrates the immeasurable values I have obtained from this course.
>
> "For many years, I have been simply amazed when I see mothers watch their children in a calm, cool, and collected manner, doing things which to me seemed very dangerous. I sometimes wondered if they were lacking in motherly love, or if they were unable to assume the burdens connected with motherhood. At the same time, I had gnawing little feelings inside that possibly I was the one who was wrong, and I secretly admired their ability to cope with a stressful situation.
>
> "During our first class discussion in regard to stress, I suddenly realized that I better do a self-appraisal, and the sooner the better. I seemed to be hearing things in class that I did not care to admit even to myself. The findings I came up with were far from complimentary. I began to see that possibly I could be developing a problem in mental health. For the first time in my life, I became aware of the fact that I was the victim of an intense anxiety - anxiety over the safety of my son and daughter. As I began examining my thought processes, the evidence was clear that anxiety had become a very real thing. I found that I had been fearing for their safety every time they left the house, and that I experienced great relief when they were safely

in their beds at night. As I look back on the whole picture now, I wonder why I didn't fear that one of them might fall out of bed and break a leg. I suddenly realized that I needed some anchors in reality before this problem became so intense that it might alter the very paths our lives might take.

To give me a start on the solution of my problem, I gradually began to think back into my own childhood. Many very happy times and pleasant memories were recalled of a home in which there was a great deal of love and understanding. Underlying all the very happy memories, were a few that brought real sadness to a little girl. What were these unpleasant memories connected with? Yes, with the anxieties of my parents for my safety. The first one I recalled was the time a neighbor boy was giving rides on his motorcycle to all the girls in the neighborhood. I was right there waiting my turn, as happy and eager as all the rest, but my turn never came, for I was stopped from doing such a dangerous thing. I sadly became the unhappy spectator, instead of a happy rider.

The next incident that clearly stands out in my mind was the time I stood and watched our neighbor boy drive the tractor on the hay rope. How I longed to drive that tractor! And wasn't it our tractor and our rope? Yes, it was, but surely the rope might break and the pulley would surely hit me. I can't seem to recall how I got even with the boy, but no doubt I thought up a good one.

An episode of major importance happened when I was in high school. Our glee club won a trip to Madison, and we were simply delighted. As a member of the committee, I worked very hard making all the plans and choosing the places of interest we might like to see. Being girls, we knew just what we were going to wear, and just what we would take along. The bottom really fell out of my world when I found out that I couldn't go. The reasons? The school might send poor chaperones, I might catch a cold, or the bus might go over an embankment. Yes, someone might even run off with me. Just about that time, I could think of not one single reason why anyone would even want me! As I recall, I don't believe I even made a fuss about it. I guess I was thoroughly conditioned.

To heap insult to an already stressful situation of long duration and deep intensity, one more incident happened. When my own little daughter was in kindergarten, her closest little friend suddenly darted one day, directly into the path of an on-coming car. She was killed instantly. Now I really needed anchors in reality. From that day, I went all out in guarding the safety and well-being of my children. My husband tried to help me overcome my anxieties, but little was accomplished.

It was not until I started taking this course in mental hygiene that I got the awakening I needed. I found that I fit neatly into the pattern of long duration, intense stress, and naturally, consequences. What were the consequences? Disgruntled children who never could have any fun, an overly anxious mother, and I should think, a thoroughly disgusted husband. I decided I simply had to take matters in hand and do something constructive about the unpleasant situation. One day when I was reading Shaffer and Shoben, I came to this passage, "When you are angry, you can fight, and when you are afraid, you can run. But when you are anxious, you are merely all stirred up and unhappy." Surely, I felt, the author must have been talking about me. Didn't I feel stirred up and unhappy every time my son went to work on his tree house? I seemed to wait in dread for fear the hatchet would slip, or someone would push him out of the tree. To make matters still more complicated, I had done a pretty successful job of keeping my fears hidden, rather than bringing them out in the open and talking about them.

Because of what I was learning in this course, I finally decided that I had to change my way of thinking before it became a dominating factor in the plans, hopes, and future of my family. It could easily be that I was developing the same anxieties in my children. I made up my mind to "zero in" on my problem.

I began by listening very carefully every day in class for ideas which might help me, and I attempted to do some reading each day that I felt might be beneficial to me. At the same time, I made a promise to myself to cheerfully enter into all family activities, and be "game to go", no matter how dangerous I felt the situation to be.

As another step in my procedure, I began talking to my friends about dangers of childhood, and brought my own problem out into the open. I also discussed it with my husband, and most important of all, with my mother who has possibly had the greatest effect on early structuring. The more I talked about it, the more minor it became. As I began to look back at my children's early years, they had had nothing worse than slight colds. What was all the anxiety for? For the first time, I could readily see how right my husband had been in assuming that I was an over-anxious mother.

How successful have I been in my self-initiated learning? Enough so that I feel as though I have come out of a dark room into the beautiful sunlight. I think one sentence from my son last night better sums up my success than any detailed evaluation I might make. When we went boating and water skiing, I didn't even once remind the children to be careful. I sat in the boat, thoroughly enjoying it, and I was able to laugh when they laughed. With a big happy smile on his chubby freckled face, my son looked up at me and said, "Gee, Mom, you sure had fun tonight, didn't you?" Little will he ever know how much those few simple words meant to me. I feel that nothing more needs to be said; he made my evaluation for me.

> "I deeply regret that I have been unable to do better work in this course, because of so much time and concentration spent on over-coming my anxiety, but in self-satisfaction I have earned an A. I do not hesitate to say, that in my estimation, it will probably be the best job I will ever do. The knowledge and insight gained from this course has given me an entirely new outlook on life, unhampered because of fears and anxieties."

Summary

From the data summarized herein, it seems clear that when students are given credit for their self-initiated learning even in an otherwise regular class that they experience a heightened sensitivity to all of their experiences, both past and present, and that they learn from them and see applications of their learnings in their future personal and professional lives. They are able to formulate improved strategies of inquiry and to propose future plans of applications. The indications are that this aspect of the course contributes significantly to the students' motivations and skills for continued learning.

Chapter 25

WHAT SHOULD SCHOOLS DO ABOUT REWARDING CREATIVE BEHAVIOR?

Since each of the over thirty small investigations which have been described in this volume have been summarized already, no summary of the separate studies seems to be needed here. Since these studies are interrelated and gain much of their strength from what they add to one another in combination, we do need to ask how all of these studies add up and what they tell us about rewarding creative behavior in schools. Some of the investigations which have been reported have little value, when taken separately. When seen in relation to other investigations, however, they become more powerful and provide guidance in deciding what should be done about rewarding creative behavior in the classroom.

Since a person's way of teaching must be his own personal invention and must come into being through the process of creative thinking, I do not believe that research can ever "tell a teacher what to do." The results of research, however, can serve as useful guides in the teacher's invention of his way of teaching, just as scientifically-developed information can serve as a guide to the inventor of a new machine or the discoverer of a revolutionary new scientific principle. It is well known that educational research is a generally neglected resource for improving educational practice. Many of the discoveries of educational research have never been used and it has been estimated (Shane and Yauch, 1954, p. 71) that it takes between 75 and 100 years for an educational theory to be translated into common practice. While it cannot be claimed that the findings of the studies reported herein are widely accepted into practice today, we do have considerable testimony from educators throughout the United States that many of the findings of these studies have been translated successfully into practice. The results of some of these studies were reported to professional groups as early as 1959 and 1960 at national and state meetings and in professional journals. A preliminary summary report was made available in the fall of 1961 and this apparently stimulated action by a number of people. Thus, although I am burdened by feelings of guilt and shame over the delay of this final report, it is gratifying to know that already the findings of the studies have proved to be useful. A few of these applications will be reported and discussed as I attempt to discuss the guidance and direction which I believe these studies provide in creating change.

Creating an Environment Which Values Creativity

Applying Principles for Rewarding Creative Thinking

While some educators and psychologists have attacked what I have called "principles for rewarding creative thinking" as unvalidated hypotheses, others have attacked them as nothing more than "self-evident truisms or annoyingly pat exhortations." Although I must admit that my observations of classroom teaching made these ideas for rewarding creative thinking seem obvious, I rarely found teachers applying them. If they are self-evident truisms, I was convinced that few teachers acted as though they believed them. Thus, it seemed clear to me that the application of these simple ideas such as being respectful of children's questions and ideas could be a very powerful force in bringing about a more creative kind of education. I was also aware of a considerable amount of expert opinion in scattered sources which supported the validity of these ideas.

In my judgment, the data which were presented in Chapter 5 show that many teachers do not understand and accept these ideas and that when they do apply them with fidelity, signs of creative growth are evident. I have been very pleased to note that a number of leaders in the field of creative education have tested and found useful these ideas. Harold Harding at the Ohio State University (1963) reports that he found that their experimental application transformed his own teaching. Benjamin Fine (1964) in his book, *Stretching Their Minds*, described how these ideas have become guiding principles or "rules" at the Sands Point Country Day School of which he is headmaster. He points out (p. 155) that authority prohibits questions but that the rule of the Sands Point Country Day School is: *Treat questions with respect.* "Rigid authority deprecates ideas offered by pupils." The Sands Point rule is: *Show pupils that their ideas have value.* "Rigid authority does not provide opportunities for practice and experimentation without evaluation." The rule at Sands Point is: *Encourage opportunities for practice or examination without evaluation, grading, marking.* "Rigid authority does not encourage self-initiated learning." The rule at Sands Point is: *Encourage and evaluate self-initiated learning. Discuss it, stimulate it, give credit for it.*

To me, the key concept of Chapter 5 and to an extent in all of the studies which follow it is "respect" -- respect for the questions and ideas of the child, respect for his right to initiate his own learning effort, respect for his right to reject the adult's ideas in favor of his own after serious consideration. This is a difficult concept to apply consistently. Certainly the teacher should feel free to suggest ideas and to give guidance and direction. The child should be free to reject the suggestion in favor of his own ideas, after considering it and deciding that it is not best for him. Devastating criticism, making fun of the child's remarks, and laughing at his conclusions, however, can hinder the child from expressing himself. It is important that children express themselves, because we will not know what they are thinking, unless we let them talk. Neither can we know what children are thinking, if we feel that we must "nip in the bud" every idea children initiate.

We can learn some lessons about the role of respect from the studies of engineers and industrial psychologists (Lasswell, 1954). At first, engineers in their investigations of human behavior were primarily concerned with technical factors in production and distribution. Later, they became concerned about the importance of affection and skill. More recently, however, they have been concerned about the importance of respect. They have found that the role of respect is often far more powerful than monetary differences.

In discussing the role of competition among adolescents, Coleman (1961) maintains that the fundamental competition among the members of any group is the competition for respect and recognition from others around them. He found that in different adolescent societies, different achievements bring this respect and recognition. I believe that Coleman would say that the removal of creative kinds of achievement as a basis of comparison will not lessen the amount of competition. It only shifts the arena away from creative achievement to other kinds of achievement.

Finally, it should be pointed out that the experiences described in Chapter 5 indicate that our values may cause us unconsciously to punish creative behavior when we think that we are rewarding it. It is hoped that devices such as those described in Chapters 20 and 21 can be used to help us become aware of the ways in which our values interfere with our rewarding creative behavior.

In-Service Education for Rewarding Creative Behavior

The in-service education study reported in Chapter 6 was inconclusive and illustrates many of the difficulties of conducting research involving this kind of education. Since such studies are expensive, many difficult decisions have to be made regarding the selection of subjects and instruments of evaluation. In the present investigation, we chose to randomize the selection of teachers within a single school and run the risk of maximizing the Hawthorne effect in the control group. Thus, it seems rather certain from the evidence obtained that the control teachers used as many creative activities as the experimental teachers. At the same time, it also seems rather certain that the experimental teachers fell far short of applying the experimental treatment in a skillful manner.

In spite of the above difficulties, however, there are indications that the in-service education program was successful in a number of ways. It is quite interesting, however, that the efforts of some of the experimental teachers apparently resulted in one type of creative growth while those of another resulted in a different kind of creative growth. This is not surprising since the best evidence indicates that creative thinking ability is not a unitary ability. It is to be expected that one type of practice will result in certain types of growth and not in others. The kind of growth may depend in part upon the concept the teacher has of creative thinking. For example, some teachers see elaboration (making things fancy or elaborate) as central to the nature of creative thinking, while others emphasize fluency, perhaps at the expense of elaboration. Still others emphasize originality and give practice in making unusual and clever responses, perhaps at the expense of both fluency (number of responses) and elaboration (detail). With timed tests, such as those used in this study, these differences in emphasis are likely to have strong effects.

Educational change almost always arouses resistance, even when the change is voluntary. In the present study, it would have been easy to have gotten one-half of the teachers to volunteer for the in-service training program. If we had done this, it is quite likely that we would not have met with resistance. Quite obviously this would not have been fair, however, and the subject teachers accepted this. We did encounter resistance, although every teacher was cooperative and pleasant throughout the study. Some of the experimental teachers frankly resisted even the notion of rewarding creative thinking. To them, it was morally wrong to reward creative thinking. The formulation of principles such as, "Be respectful of the questions of children," and explanations that one of the best rewards for the curious child is to find the answer to his questions perhaps helped somewhat. Some of the teachers felt that creative thinking should not be rewarded and should be engaged in for the pleasure of the process.

Educational researchers conducting in-service education experiments should be prepared to cope with the resistance of teachers to change. Adequate time and conditions favorable to continuous interaction between the experimenter and the experimental teachers is needed. Eicholz (1963) has offered an interesting theory on why teachers reject change. His theory of rejection involves five stages: awareness, disinterest, denial, trial, and rejection. A teacher might be resistant through the early stages and become an acceptor and this occurred in at least one case in the study described herein. The converse may also be true. On the basis of long years of experience and of a study of innovation in five elementary schools, Eicholz believes that five steps are necessary to overcome resistance to change at the various stages in the process of rejection.

First, the ignorance of teachers about the change must be overcome. We sought to overcome ignorance in the present case by supplying teachers with the manual which had been prepared for the purposes of the in-service training program and by a continuous flow of informative materials and ideas throughout the experiment. These, however, are no guarantee that ignorance was overcome. In fact, it was clear that some of the experimental teachers did not read the materials with which they were supplied. Perhaps the best that we can do in schools, however, is to have information about innovations readily available to teachers in lounges and classrooms and to discuss innovations in faculty meetings.

Second, the matter of suspended judgment must be dealt with. Some teachers want to wait and see how good an idea is before they try it. A few teachers, however, are always willing to go ahead and test new materials and ideas. Thus, such teachers should be encouraged to go ahead without trying to involve everybody in the change.

A third factor is providing a general environment conducive to experimentation. This is one of the reasons why group or all-school experiments are sometimes useful.

A fourth factor, however, grows out of the anxiety of teachers who do not want to change but who witness successful changes among their colleagues. Since this may arouse still greater resistance, it is dangerous to try to force change or even to encourage change.

A fifth factor arises from the fact that some teachers engage in experimentation to "prove" that the change is harmful. Depending upon the teacher's honesty and objectivity, as well as the desirability of the change, this type of resistance may be transformed into acceptance.

Creative Motivations of Teachers

Chapter 7 presents some rather interesting evidence to support the idea that the creative motivations of teachers are a significant factor in the creative growth of pupils. In one study, it was found that the pupils of teachers with high creative motivations made greater gains in creative growth than those of teachers with weak creative motivations in the kindergarten, first, second, and third grades. This did not occur, however, in the intermediate grades. In another study limited to the intermediate grades, however, it was found that pupils of teachers with high creative motivations made significant gains in creative writing while those of teachers with weak creative motivations failed to achieve significant growth in this aspect of development. In my opinion, the weight of the evidence in this experiment indicates that efforts to engender greater curiosity and zest for learning among teachers will be worthwhile in terms of the creative growth of their pupils.

In the light of these findings, Robert French's (1961) idea concerning the infusion of the spirit of research into teachers seems quite appropriate. French argues that stimulating habits of questioning orthodoxy, of demanding evidence, of trying the new or testing the old and observing what happens should lead to increased teacher effectiveness. This does not mean that teachers should go into the research business but that the adoption of some of the habits and attitudes of the researcher is compatible with creative teaching.

The Principal and the Environment Which Values Creativity

Among the many serendipitous findings reported in this volume are those reported in Chapter 8 concerning the role of the school principal in the environment which values creative thinking. Now, in perspective, the findings seem quite obvious, not just in regard to the introduction of more creative ways of teaching but in regard to all educational experimentation. Teachers will be reluctant to experiment with innovations if they are not certain that their immediate superiors (principals, department heads, and the like) approve of the innovation and support them in its experimental testing. In planning the study described in this chapter, we had not been able to predict the turn of events. In the city-wide workshop, we were in a number of ways stacking the cards in our favor by including in the experiment only those teachers who volunteered. The elementary supervisors certainly gave the study their strong support and stated explicitly that they approved. Yet it is quite clear that the control teachers used as many of the experimental procedures, if not more, than the teachers who volunteered to experiment with ideas for teaching language arts in more creative ways.

It is interesting to note that both of the elementary supervisors who attended the in-service session and at least a majority of the teachers who participated regarded the experience as an unusually successful one. They expressed a high degree of satisfaction on a number of occasions during the two or three years which followed the experience. It is quite possible that their evaluation was correct. It may have been asking too much to expect teachers to apply immediately the ideas which were presented in the in-service education program. It is also true that the results may have shown up in ways not considered in the evaluation procedures used. The fact remains, however, that the control teachers used as many of the ideas for creative teaching of the language arts as did the experimental teachers who volunteered in the city-wide in-service program. Still more striking is the finding that experimental teachers whose cooperation was obtained through their building principal not only used more of the experimental procedures than did their colleagues in the city-wide workshop, but their pupils made significant gains in their creative writing whereas those of their colleagues failed to do so.

There seems to be little question but that the building principal plays a key role in getting into practice experimental procedures. He is the person closest to the teacher in the reward structure in which teachers operate. In addition to the day-by-day rewards of encouragement, support, and approval within the power of the building principal, much of the teacher's status, future advancement, reputation as a teacher, and the like are linked with the building principal's evaluation of the teacher.

Creative Activities in the Environment Which Rewards Creativity

The findings reported in Chapter 9 concerning the role of creative activities in the environment which rewards creative behavior may be somewhat disturbing or puzzling to many educators interested in bringing about a more creative kind of education. Of course, there are obviously many facets of this problem which were not considered in the studies reported in Chapter 9. Actually, the results of the studies reported do not tell us that creative thinking activities are unnecessary in bringing about creative growth. They only tell us that something more than creative activities are necessary and that one of the additional factors is the creative motivation of the teacher. This is in spite of the fact that teachers having high creative motivations reported more creative thinking activities than their less creatively motivated colleagues.

We cannot ignore the long-standing and widespread advocacy of creative thinking exercises or activities. Binet's "mental orthopedics" undoubtedly played important roles in his work with the mentally retarded child's growth. Marie Montessori's provision for intervals during which children veiled their faces and thought doubtless contributed to creative growth. Dimnet (1930) undoubtedly had good reasons for advocating that children ought to be put through regular thinking exercises in school. Coleman (1961) was justified in his objection to the fact that the prescribed exercises of high school students "require not creativity but conformity, not originality and devotion, but attention and obedience." Stein undoubtedly had some empirical basis for his statement that "one of the first things that a college can do is to provide an opportunity for the student to manifest his creative potential" (1958, p. 72). The findings of the studies described in Chapter 9 do not argue against the above conclusions. In fact, they actually support them. They go further, however, in arguing that creative activities alone are insufficient for producing creative growth. The suggestion is that the attitudes and values of the teacher and/or of the larger environment must reward creative behavior. Nothing could be worse than to stimulate or urge creative behavior and then to punish such behavior.

Differential Rewards for Boys and Girls

The data presented in Chapter 10 from a variety of sources support in numerous ways the idea that our society does reward boys and girls differently. There seems to be little question but that our society through these differential rewards puts off limits for boys certain areas of awareness and thinking and for girls certain other areas. It seems equally obvious that differential rewards in these ways take a rather heavy toll upon the potentialities of both boys and girls. Specific findings provide clues about what teachers can do to help both boys and girls achieve more nearly their potentialities.

It seems rather clear from a number of indications that teachers can improve the education of boys by providing more creative ways of learning and rewarding them for creative behavior. A number of studies have already shown that males in our society excel females in various kinds of problem-solving tasks. Yet observers of classroom behavior rarely find enough problem-solving teaching to record. When we add this to the fact that other measures of educational achievement such as vocabulary, spelling, reading, and the like almost always favor girls, we begin to grasp at least a part of the problem. In one of the studies described in Chapter 10, it was found that when teachers are asked deliberately to reward creative behavior, they usually describe incidents in which boys have been rewarded. This may mean that such a shift in emphasis brings about a better equalization of rewards for boys and perhaps a greater equalization in learning. Of course, it might also mean that teachers reward the creative behavior of boys more frequently than they reward the creative behavior of girls. It may also mean that boys may behave more creatively in the classroom, but even this may mean that girls are rewarded for conforming behavior and are satisfied with this reward.

The results of one of the other studies described in Chapter 10 suggest that we may have been undergoing some social changes which have made it legitimate for girls to be interested in science matters and to enjoy dealing with them. In spite of this change, however, children still value more the science ideas of boys than they do those of girls. This indicates that many of the preferences of boys and girls are culturally determined rather than genetically determined.

It is apparent from the data presented that the differential rewards for boys and girls are very pervasive and permeate all areas of their lives. The study of the creative activities done on their own indicates that there are many areas of childhood creative experiencing which seem to be off limits for boys and girls apparently because of their sex. Similar phenomena are found in regard to the occupational goals reported by children and young people. These differential rewards were also shown to be accompanied by differences in such experiencing as manipulation of objects and reading, kinds of experiencing likely to be related to creative achievement. Finally, it was shown that the influence of these differential rewards on the development of the creative thinking abilities is complex but that there are nevertheless differences which can be associated logically with the nature of the differential rewards and their influence on the kinds of experiencing open to boys and to girls.

It would be foolhardy to ask or to expect that boys and girls will be rewarded in the same way. It seems equally foolhardy to place off limits to children so many areas of childhood experiencing and awareness because of their sex.

External Evaluation

Originality of Thought and Differential Rewards

Although we had anticipated, if not assumed, that rewarding originality would increase the degree of originality found in the creative writing of children and in the number and quality of the original ideas produced by them, we had not expected to find the side effects as complex as they turned out to be. Rather consistently, we found in the studies reported in Chapter 11 and elsewhere that rewarding, encouraging, or otherwise making originality of thinking legitimate does in fact result in greater originality than occurs otherwise. In the writing experiment we found that there was also a tendency for children to write longer stories than otherwise when originality was being rewarded but that they also made more errors, at least in their first drafts.

In the second study, it was found that rewarding originality did not interfere with the fluency of ideas and, in fact, tended to increase the number of ideas produced. In still another study not yet reported, it was found that instructions to produce original ideas stimulated greater fluency than instructions to produce a large number of ideas, regardless of their quality. Thus, it seems that making unusual or original ideas legitimate does more to free individuals of forces which inhibit the production of ideas than does instructions to produce a large number of ideas. To add to the complexity of the picture, however, we found in the second study reported in Chapter 11 that flexibility of thinking was unaffected.

Thus, even when we are concerned about creative behavior, we need to decide what kind of creative behavior we want to develop and make our instructions and rewards compatible with the goal.

Interfering Effects of External Evaluation

We have known for a long time that one of the critical problems in facilitating learning is in providing the correct amount and kind of guidance -- enough but not too much. Thus, it is not surprising to learn that excessive external evaluation, regardless of its type, interferes with creative thinking. The implications of the findings reported in Chapter 12, however, even go further than this. The interference effects of excessive external evaluation during the practice session tended to inhibit the productivity of groups of children in the test task which involved no evaluation.

Three types of evaluative practice were applied in the experiment described in Chapter 12: identification of defects, suggestions of other possibilities, and a combination of identification of defects and suggestions of other possibilities. Using 18 criteria at three different grade levels, no statistically significant difference could be found for differences in evaluative practice. When groups were classified according to the number of times the experimenter invoked the experimental condition into high and low frequency of evaluation, differences began to emerge in favor of low frequency of external evaluation. This was in spite of the fact that the experimenters had been careful to try to reduce the threat of evaluation during the practice session by making it clear that performance during the practice session would not count toward winning the group award to be given in each grade.

There are doubtless learning and/or thinking tasks for which differences in types of evaluation given during practice will make a difference. There are doubtless individuals and groups for which differences in type of evaluative practice will make a difference. The evidence presented in this study and gleaned from other sources, however, have convinced me that type of evaluated practice as defined here is not a very powerful variable. In fact, the evidence was so strong from other experiments in this series and observational experiences, that there was great hesitancy in conducting the experiment described in Chapter 12. Had it not been specified in the contract with the U. S. Office of Education, we would not have conducted it. All possible efforts were exerted, however, to conduct it as objectively as possible. In spite of initial doubts, the author was still surprised that no differences emerged for any of the criterion variables.

Regardless of the lack of conclusiveness of the findings, it seems rather clear that teachers need to exercise caution lest excessive evaluation on their part interfere with learning and creative thinking. The creative thinking processes do not have a chance to function if the child is constantly being bombarded by external evaluation, regardless of its nature. Such interference throws off course the thinking processes and makes discovery difficult or impossible.

Competition as a Type of External Evaluation

The role of competition in encouraging creative behavior is a complex one and the studies described in this volume attempt no comprehensive approach to its understanding. In the simple studies reported in Chapter 13, however, it is clear that competition increased the production of ideas, other things being equal. When warm-up or practice experiences were provided, however, much of the advantage which seems to accrue from competition disappeared.

The evidence seems to be sufficiently strong to indicate the need for some reassessment of practices in education regarding competition. It turns out that it is practically impossible to eliminate competition among children. If this proves to be the case, it may then become a matter of maintaining reasonable controls on competition to keep the stresses arising from it from becoming too great and of shifting the focus of competition to other areas or to a variety of areas of behavior.

Many of those who favor scholastic and interscholastic competition in areas other than athletics believe that sporadic and infrequent competition has little effect. The study described in Chapter 13, as well as those described in Chapter 17, suggests that the value of such competition may be underrated insofar as the stimulation of certain types of creative achievements are concerned. They tell us nothing about the long-range effects of continued competition, however. One of the differences between competition as used in Chapter 13 and as used in Chapter 17 is that the former involved individual competition while the latter called for intergroup competition. One of the surprising things about the behavior observed in the intergroup competition, however, was that individual competition still loomed as a powerful force. This was in spite of the fact that deliberate and forceful means were used to make the competition intergroup rather than interindividual. Apparently, at least in our society, interindividual competition is learned very early and appears more natural than intergroup competition.

If we could be successful in schools in stimulating intergroup competition in various kinds of creative achievement, we might thus eliminate or at least reduce one apparently very powerful inhibitor of the development of creative potential. As Coleman (1961) found in his study of adolescent society, the boy who goes all-out scholastically is scorned and rebuked for working too hard. The athlete who fails to go all-out, however, is scorned and rebuked for not giving his all. Coleman maintains that this is because the scholar's efforts in our present educational structure can bring glory to no one but himself and makes the work of others more difficult. The athlete's achievement, however, appears as a part of a group effort and brings glory to his school or some other group. Thus, he is working for the good of the group.

One factor which worked in favor of competition in both the inter-individual and intergroup competition in these experiments is to be found in the fact that the teacher was not the evaluator. The role of evaluation resided in someone outside the classroom situation and may have been perceived as less threatening than when employed by the classroom teacher. In much of the ordinary competition which goes on within a classroom, the teacher is forced to be the judge as well as the teacher. Perhaps much of the rebellion and much of the conformity which occurs in the classroom may be due to this state of affairs. If an educational system could restore the role of the teacher as teacher and relieve the teacher of the onus of sorting and grading students, we would probably have a higher level of both learning and thinking in schools. It cannot be denied that competition is one means by which challenge occurs, and challenge, if not overwhelming, is apparently conducive of creative achievement.

Unevaluated Practice

Although the experiment comparing the effects of unevaluated practice with positive, constructive evaluation was not conclusive, the evidence is strong enough to tip the scales in favor of unevaluated practice. The results were such as to suggest that some individuals need the structure given through evaluated practice while others perform more creatively under conditions of unevaluated practice. In general, the importance of unevaluated practice seems to be clearer in the first four grades than in the fifth and sixth grades. It is interesting to speculate why children in the fifth and sixth grades seem to function at a higher level under the more structured conditions, whereas this is not true in the lower grades. Although the results are not altogether consistent, there are a number of hints that girls may require a higher level of structure than do boys. There are also some indications that some types of creative achievement are more sensitive than others to the influences of unevaluated or evaluated practice. Several different experiments controlling different influences in each will be necessary to elaborate the hypotheses which emerge as side-effects in this study.

Critical and Creative Peer Evaluated Practice

In general, the results of the experiment described in Chapter 15 indicate that pupils in the upper grades do better creative work under creative peer evaluation (suggesting other possibilities) than under critical peer evaluation. To the younger children, differences in the type of peer evaluation appear to make no differences. In fact, the younger children were not very interested in making critical evaluations of one another's work and seemed to pay little or no attention to such evaluations when they were offered. Even in the experiment described in this report, there are indications that consistent use of creative peer evaluation will have more beneficial effects in the lower grades than will critical peer evaluation. In the second task given in this experiment, both the older and the younger children tended to do better creative work under creative than under critical peer evaluation. Even here, however, children in the in-between grades behaved differently. Rather generally, the third grade children tended to perform better under the critical evaluation condition and those in the fourth grade were not differentially affected.

Doubtless, there are conditions under which one type of peer evaluation is more productive than the other. Generally, however, the scales seem to tip in the direction of creative peer evaluation. Developmental differences must be taken into consideration, however.

Talking With Children About Their Creative Productions

The study described in Chapter 16 makes no attempt to determine how teachers should talk with children about their creative productions. It seeks merely to determine how teachers say that they talk with children or say that they think they should talk with children about their creative writing. In the opinion of the author, teachers seriously lack the concepts and understandings of creative writing necessary to talk with even young children about their creative writing. They tend to oversimplify their comments in terms of generalized praise or criticism, especially insofar as the content is concerned. Their concepts about mechanics are somewhat clearer and better defined. This makes teachers hesitant to talk with children very constructively about the creative aspects of their writing. It has occurred to the author that teachers might improve their conversations with children about their creative writing by using some of the concepts our research staff developed for use in evaluating the creative qualities of imaginative stories -- concepts such as original or surprising endings, unusual settings or plots, picturesque speech, vividness, flavor, humor, individuality of style, imagination, emotions or feeling, curiosity, and the like.

Many of the plans offered by teachers for talking with children about their creative writing reflect man's strong needs to punish and to pity his fellow man. Criticism and praise are among the favorite weapons and defenses of the respondents. Appeals to the child's own creative resources, the use of self-evaluative approaches, and the like are rarely used. There was little recognition that the mental health of children may interfere with both the creativeness and the correctness of their writing. These reflections on the data presented in Chapter 16 should not be interpreted as an admonition against praise or criticism. Both may be necessary and each certainly has its place in talking with children about their writing. My point is that both are probably over-used in favor of a more exploratory, penetrating, and sensitive thinking together about the creative production. Above all, the conversation with the child about his writing should encourage him to continue his efforts -- efforts which are marked by honesty, originality, and freshness of style.

Mauree Applegate (1949) who has given sustained and intensive study to the problem of helping children write, says that she has seen teachers maim with a red pencil writing that was really brilliant in part. She explains that the artist at writing is often not a careful person, especially during the heat of creation. She also counsels that different attitudes should predominate when teachers are talking with children about voluntary stories than when talking with them about assigned stories. She does not think that voluntary stories should be evaluated unless the writer asks that they be. She feels that such stories were written for enjoyment and should be enjoyed rather than corrected or evaluated. She would talk with children about voluntary stories, if the stories are outstanding, show marked improvement, or are far below the level of the writer's ability. She recommends that children be asked to read assigned stories to the teacher while other pupils are engaged in another activity. During the process the story is discussed with the child.

Homogeneous and Heterogeneous Groupings

Neither our results nor those of all of the other studies that have been done on homogeneous and heterogeneous grouping, tell us whether homogeneous grouping is "a good thing." In fact, I think these results tell us that the problem is too complex to be answered in this way. I believe, however, that the design of the homogeneous and heterogeneous models developed in the present studies can be used in answering many theoretical questions in such a way as to give useful guidance in exploiting the advantages of both homogeneous and heterogeneous grouping. I believe that the results of the present studies show that homogeneous groups reduce the social stress in groups at all ability levels and elicit all-out responses among children of lower ability, at least for short periods of time.

I suspect that the extremely creative individual will always be rather unpopular among his peers and except in rare circumstances will not become a leader. This is probably "a good thing" since the responsibility of leadership toward other people often prevents a person from experimenting with new and uncertain possibilities and causes him to surrender his imaginative, critical, cynical, devil's advocacy. As Richard Suchman[1] suggests, it may take a lone wolf to penetrate the wall of oversimplication that the nonthinkers build to protect their togetherness. Suchman believes that a classroom full of highly creative youngsters could be highly productive. He says he has found the imaginative and critical hole pokers are the least disturbed by the hole poking of others. They welcome this disruptive hole poking and return the service in kind.

Anyone who has worked with heterogeneous groups of children will report that most highly creative children are difficult to work with in such groups. Frequently, their unusual ideas and brilliant flashes of insight, if communicated, arouse resentment. The resentment and rejection may have either one or two ill-effects on the creative individual. He may become an extremely disruptive influence as a result. Suchman believes that it does not make sense to try to work in a group with highly productive and creative children where the rest of the children simply do not measure up. There does not seem to be any compatible arrangement, since the more opportunity you give such a child to exercise his abilities, the more hostility you create between him and the others. On the other hand, the more you suppress him, the more he resents you and the entire situation. The highly creative child may also become non-participating. In an individual situation, the child may be creative and highly verbal and then may clam up during the group session. It is a considerable risk to involve such a child until he feels comfortable in participating. It is a challenge to create a situation in which such a child will become an active participant. If the teacher is able to create a classroom situation in which questions and ideas are respected, non-participators may become the most active and valuable contributors.

Two or three school principals have reported very exciting experiments in which they have grouped the classes of certain grades according to the general level of their creative behavior, using a combination of test results and creative achievement as a basis for grouping. In one school, such an experiment is in its third year and teachers seem to be quite pleased with the outcomes. The problem is a complex one, however, and such a practice certainly cannot be recommended for all schools and further testing and evaluation are certainly needed.

An example of the type of study needed to determine the differential effects of different approaches to grouping is a study reported by Wanner (1960). This study investigated the differential effects of different seating arrangements on social interaction and independent behavior in sixth-grade classrooms. It was found that if more social interaction is desired, children should be seated next to children of their choice. If more self-reliance is desired, children should be separated from others of their choice. Thus, here as in the studies described in Chapter 17, the decision concerning grouping must be influenced by the type of development which is of concern.

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[1] J. Richard Suchman, Illinois Studies in Inquiry Training, University of Illinois, Urbana, Ill., personal communication, October 21, 1960.

Positive, Negative and Trouble-Shooting Evaluation

The study of the evaluative behavior of the more effective mathematics teachers compared with that of the less effective teachers helps to point us away from an obsession with comparisons of the effects of praise and criticism. This study is clearly related to creative thinking since the experimental mathematics materials being used in the study emphasize creative ways of learning mathematics rather than the more authoritarian ways. The results show that these two groups of teachers both offer their students a considerable amount of both praise and criticism, with the less effective teachers offering a greater amount of both praise and criticism than their more effective colleagues. Their more effective colleagues offer instead of praise and criticism a kind of trouble-shooting or hypothesis-making evaluation. These results support the hypothesis of McDonald (1959) that the crucial role of the teacher is that of the hypothesis-maker. Having obtained these clues, our task is now one of analyzing more fully the nature of the hypothesis-making evaluations of effective teachers.

Cultural Differences in the Evaluation of Creative Characteristics

Using the evaluations of samples of teachers obtained in the general areas of Buffalo, New York, USA; Berlin, Germany; Baroda, India; Volos, Greece; and Manilla, Philippines as examples, it was shown that cultures differ rather markedly among one another in terms of the characteristics which they value and encourage or disapprove and discourage. The data indicate that insofar as creative values are concerned, all five of the cultural groups studied have some features which support creative behavior, while others have questionable value and others are outright detrimental.

The specific data provide hypotheses about the ways in which each culture might more adequately serve the needs of the creative person and encourage more creative kinds of behavior. For example, comparisons with the ratings of experts on the creative personality suggest that all five cultures may be unduly punishing the good guesser, the child who is courageous in his convictions, the emotionally sensitive individual, the intuitive thinker, the individual who regresses occasionally and plays or acts childlike, the visionary individual, and persons who are unwilling to accept things on mere say-so without evidence. All of them may be giving undue rewards for being courteous, doing work on time, being obedient, being popular and well-liked, and being willing to accept the judgments of authorities. The Buffalo, New York, teachers alone are rated as unduly discouraging strong emotional feelings and unduly encouraging receptiveness to the ideas of others. All in all, however, the values of the Buffalo teachers correspond more closely with those of the panel of expert judges and appear to be most compatible with creative development. Germany, India, Greece, and the Philippines follow in that order.

The underlying theoretical rationale developed through work with the Ideal Pupil and Ideal Child Checklists supports the idea that creative people need creative handling, whether in the classroom, the home, or the factory. Executives who cannot tolerate the independent spirit should not try to supervise the work of creative people. Usually, they will create problems thereby rather than increase productive creativity. Similarly, the teacher who cannot tolerate the independent spirit in children will have difficulty in guiding the learning and thinking of the highly creative child.

Evaluation of Divergent Characteristics and Behavior

The studies reported in Chapter 20 begin an exploration of one of the most fundamental of all the dynamics involved in the role of evaluation in the development of creative thinking -- the evaluation by the culture of divergency or differentness. This problem seems to be especially important since there is considerable consensus that there is a great need in our society to cultivate a diversity of talent (Wolfle, 1960). Comparisons were made through the device of imaginative stories written by preadolescent children in each of seven cultural groups of reactions to divergent characteristics of animals and people. It was found that children in different cultures do indeed perceive different evaluations of divergency.

Stories were obtained from children in Minneapolis-St. Paul, Minnesota; International Falls, Minnesota; Croydon, England; Paris and Roanne, France; San Juan, Puerto Rico; Turkey; and Greece. The over-all differences among the stories from these seven groups are rather large in regard to the extent of the pressures against divergency, the nature of the pressures, and their consequences, concern about the causes of divergency, and the evaluation of divergency. About fifty per cent of all of the stories described the existence of pressures against divergency. Children from the New World cultures more frequently perceived pressures against divergency than did children from the four Old World cultures.

The Twin Cities children expressed the greatest peer-orientation and the least society-orientation insofar as the source of the pressure is concerned. Children in International Falls, Minnesota, however, showed a strong society-orientation. French children showed the least peer-orientation and saw most of their pressures coming from persons occupying certain legitimate cultural roles. Turkish, Puerto Rican, and Greek children seem to be more strongly oriented towards inner compulsions or the self as the source of pressure.

Looking at the total pattern of results, it might be hypothesized that the creative growth of Twin Cities children might be facilitated by a relative decrease in peer pressures, a reduction in the use of laughter and ridicule against persons who are different, less use of shock and surprise concerning behavior which is different, reduced emphasis on efforts to conform when conformity is not constitutionally possible or efforts to conform are disproportionately great in comparison to the rewards of conformity, increased concern about the causation of divergency rather than concern about eradicating the divergent characteristic and increased willingness to exploit the positive possibilities of divergent characteristics.

Evaluative Behavior of the Individual

Helping Children Value Their Ideas

Although the experimentors commited unintentionally errors which marred the potential effects of the investigation described in Chapter 21, the experience does indicate that children can be helped to value their ideas and those of their peers. Doubtless this can be accomplished through many vehicles, but the one used in this instance was encouragement to write on their own outside the curriculum and publication of ideas in an attractive magazine. These experiences were accompanied by creative growth in the third, fourth, and sixth grades. The fifth-grade children became disturbed concerning the over-editing of their writing and apparently as a result were unable to rise to their usual heights of creativeness at the time the post-test of creative writing was administered.

One of the serendipitous insights supplied by this investigation is that adults unknowingly communicate to children that they do not regard the ideas of children as valuable without really examining them. Perhaps the most important thing that parents, teachers, and other adults can do to communicate to children that their ideas are of value is to listen to their ideas, read them, and try to understand them.

There seem to be many good reasons why we should be concerned about showing children that their ideas have value. A majority of those participating in a nationwide conference on company climate and creativity (Deutsch & Shea, Inc., 1959) expressed the belief that the most important motive for creative effort lies within the scientist or inventor himself. Art educators Conant and Randall (1959) believe that the most effective form of growth measurement insofar as creative art development is concerned is self-evaluation. They believe that this ability can be developed even in the pre-school years. Perhaps one of the most important things that educators can do is to recognize that each child can do some kind of original work which has some merit. In-service and pre-service education of teachers would be contributing a great deal by removing the erroneous belief that the creative work of teachers and their pupils is negligible and not worthwhile. The usual sense of futility about doing something original should give way to feelings of confidence.

Teachers, supervisors, and principals can find many ways of showing children that their ideas have value. Original art work, creative writing, and other productions of children can be displayed in the halls and display cases of the school, in the principal's office, and in the living room of the home. They can be enjoyed in many different ways. Creative writing and other creative achievements outside the curriculum can be used for emotional and intellectual growth among troubled children. The creative achievement may not restore such children to mental health, but it can contribute to such goals.

Evaluative Attitudes and Original Ideas

Just as people have differing evaluative attitudes concerning themselves and the worth of their ideas, they also have differing evaluative attitudes concerning the information which they possess and the materials which they read. In the study reported in Chapter 22 it was hypothesized that students given experiences in examining research reports creatively (in terms of possibilities) would themselves produce original ideas of higher quality than those having similar experiences in examining such reports critically. With a group of 100 students enrolled in a course in personality development and mental health, no statistically significant differences on a test of creative thinking were found between those students randomly assigned to the critical evaluation condition and those assigned to the creative or constructive evaluation condition. There was a significant difference, however, between the judged quality of the original ideas developed by these two groups of students as a part of their course requirements.

Using the clues developed in this study, Hyman (1961) developed a more elaborate experimental design which he applied in a training program of General Electric Corporation. Under the constructive evaluation condition, subjects produced solutions on both related and unrelated problems which were rated significantly more creative than those produced by subjects in the critical condition. These results suggest that we have been asking an inappropriate question in trying to determine whether or not prior information influences the production of creative ideas. Some have argued that a person should know as much as possible about how others have tried to solve a problem before trying to solve it himself. Others maintain that a person should know as little as possible about how others have tried to solve the problem prior to trying to solve it. It may well be that it is not a matter of how much information one has about a problem but what attitude he has towards the information he possesses about a problem.

Evaluative Attitudes and Different Kinds of Test Performance

The study of the influence of different evaluative attitudes on different kinds of educational achievement is actually an extension of the study on evaluative attitudes and the production of original ideas.

Although students report varying degrees of success in shifting from one evaluative attitude to another in their reading and in maintaining a consistent evaluative set, the evidence indicates that different evaluative attitudes towards the information a person reads does indeed influence differentially different kinds of test performance. Four types of educational achievement were tested in the experiment: recognition (multiple-choice test), memory (completion), creative thinking (open-ended creative application and problem-solving exercises), and evaluative thinking (decision-making problems with decisions supported by reasons). The results related to creative evaluative sets and achievement on the creative thinking problems were consistent and statistically significant for each of the three weeks the experiment was conducted. Reading materials with a creative or constructive evaluation set was associated with higher performance on the creative applications and problem-solving exercises. It would seem from the evidence available that teachers influence the creative thinking of students through the evaluative attitudes they encourage in giving reading assignments.

Rewarding Self-Initiated Learning

Learners at all educational levels are not likely to be convinced that their self-initiated learning efforts are worthwhile and to find time and energy to pursue them unless they are in some sense given credit for such efforts. It is very easy to say that they should pursue that knowledge which they find exciting and worthwhile for the love of it. Yet, if survival and/or advancement requires kinds of achievement which are different from those things about which a person is curious and excited, there is simply no time for such pursuits. The evidence cited in Chapter 24 indicates that there has been a growing recognition at the level of national leadership for encouraging and giving credit for self-initiated learning. There has also been an increasing number of experimental studies designed to test the effectiveness of various kinds of provisions for self-initiated or self-directed study. Generally, however, these experimental efforts have been evaluated only in very narrow ways and the results have not been very conclusive. Almost all of them show, however, that self-initiated learning is about as effective as other approaches.

In higher education, most experiments with self-directed study have gone under the label of honors programs. It is likely that this kind of experimentation will become more widespread at the secondary school level and that various kinds of modifications will be tried in the elementary school. A few colleges, such as the University of Colorado and Antioch College, have experimented with various modifications of self-directed study for students at all ability levels (within the ranges admitted to the college) with encouraging results. Regardless of the varying kinds of arrangements, methods of evaluation, and the like, it does seem certain that self-initiated learning has promising possibilities but will provide no panacea. Certain types of students, certain types of teachers, and certain types of objectives lend themselves more readily to this approach to education than others. We still know very little, however, about just what these types are.

From the data presented by the author concerning his own experiences, it is evident that when students are given credit for their self-initiated learnings, even in an otherwise regular class, that they experience a heightened sensitivity to all of their experiences, both past and present, and they learn from them and see possible applications of the learnings to their future personal and professional lives. They are able to formulate improved strategies of inquiry and to propose future plans for applications. The indications are that this aspect of a course contributes significantly to the students' motivations and skills for continued learning and thinking.

Children in Defense of Themselves

Almost everyone who has conducted experiments of alternative ways of teaching or learning and have either observed or inquired later about how the subjects really learned have been amazed at the extent to which children -- and adults too -- act in defense of themselves. McConnell (1934), after conducting his well-known study of learning by discovery versus learning through authoritative identification, interviewed many of his subjects. He wrote that he was amazed at the extent to which children acted in their own defense and learned "outside the curriculum" according to their own preferences and "natural ways" of learning. In experiments involving conditions of boredom, some subjects were not bothered by the boredom because they invented ways of entertaining themselves. Thus, in all of the studies described in this volume we can be assured that many of the subjects "acted outside the curriculum" or "outside of the experimental condition" in order to have a better chance to use their best abilities and their preferred ways of learning and thinking. Although we need to learn a great deal more than we now know about what characteristics of learners are most important in planning learning experiences, we believe that the studies reported herein give some anchors to guide our planning, even though some of the anchors are not strong and are not always stable.

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Appendix 1.

PERSONAL-SOCIAL MOTIVATION INVENTORY
(Third Revision)

Arranged by
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INSTRUCTIONS: The following are statements concerning your attitudes and motivations in a variety of situations. You may feel that many of the statements duplicate each other. The purpose of these apparent duplications is to give you an opportunity to show small differences in the way you feel about things.

On the answer sheet, respond to each item TRUE or FALSE according to your present attitudes and motivations. When you are not sure or would prefer to answer, "It depends," choose the response closest to your opinion or feeling.

1. I usually put a great deal of energy and zeal into my work.
2. I think financial reward is the best incentive to good work.
3. I have often met people who were supposed to be experts who were no better than I.
4. I am apt to pass up something I want to do when others feel that it isn't worth doing.
5. I find it easier to identify flaws in the ideas of others than to think of other possibilities myself.
6. It is hard for me to work intently on a scholarly problem for more than an hour or two at a stretch.
7. I frequently wonder what hidden reason another person may have for doing something nice for me.
8. My need to know both sides of a question tends to make me indecisive.
9. I enjoy work in which I must keep trying out new approaches.
10. I am fascinated by new ideas, whether or not they have any practical use.
11. My mind often gets so caught up in a new idea that I am almost unable to think of anything else.
12. It is a matter of principle with me to be conservative in evaluating new ideas.
13. I thoroughly enjoy activity in which pure curiosity leads me from one thing to another.
14. I enjoy trying out a hunch just to see what will happen.
15. I never pay much attention to "crack-pot" ideas.

16. I enjoy experiences where I can't know what is going to happen next.
17. I feel upset when little things happen that I had not planned on.
18. I am constantly a little troubled by the possibility that I may not measure up to the standard that is expected of me.
19. If someone criticizes me, I am likely to show him that he is not so perfect either.
20. I measure my progress or success against that of my associates.
21. I rather enjoy showing a tough attitude toward some people.
22. I really enjoy a tense, competitive struggle for success.
23. I enjoy taking the responsibility for giving people advice.
24. I enjoy being in a position where my decision is the final word.
25. I find it necessary to keep some people in place by making them afraid of me if they get out of line.
26. I am constantly trying to win a position of greater influence over other people.
27. I sometimes lose myself in experimenting with an idea that may have no practical meaning for anyone else.
28. After I have decided on a course of action, I keep thinking of the disadvantages that may be involved.
29. My interest is often caught up in ideas that may never lead to anything.
30. Once an idea has captured my imagination, I feel that I must give it my full attention until I can work it out.
31. My enthusiasms sometimes blinds my critical faculties.
32. I tend to see the imperfections in things before I see the qualities I like.
33. I have to fight a tendency to be somewhat dissatisfied with most of the ideas I read and hear.
34. There is something in me that forces me to analyze, and often reject, things that other people seem to like.
35. I feel that life would be a little easier for me if I were a little less critical.
36. I make it a point to be open and direct in what I say, even though I may be criticized for it.
37. I feel rather contemptuous of some of the people with whom I must deal.
38. I would feel cut off from a satisfying life if there were no one with whom to share my confidences.
39. When I am working with a group, I am ready to argue vigorously for my own ideas as to what should be done.
40. The presence of a group stimulates me to express myself.
41. I dislike the idea that I need to depend upon the affection of anyone.
42. When I get a new idea, I drop everything to try it out.

43. I sometimes get so intent on a new idea that I fail to do the things I ought to be doing.
44. I spend a lot of time figuring out problems for myself instead of finding out what others have done.
45. I enjoy work in which I must adapt my course of action as I go along.
46. There are times when I feel justified in making someone afraid of what I might do to him.
47. I tend to lose interest in an activity when it no longer presents new problems.
48. I am inclined to be "lost to the world" when I get started on an original idea.
49. I enjoy tackling a job that I know involves many as yet unknown difficulties.
50. I find so many interesting things to do that it is difficult for me to stick to any one of them for very long.
51. I am a little discontented unless I am able to work out new ways of doing things.
52. I resist accepting the accustomed ways of doing things unless I can prove to my own satisfaction that it is the best way.
53. I feel that it is always wiser to stick to the tried and true way of doing things.
54. I sometimes do a piece of work over and over again until it really satisfies me.
55. I am constantly searching for forms of creative expression that seem natural to me.
56. Few people are worthy of my trust and confidence.
57. I think it is important to know how one stands in relation to others.
58. In a sense, animals make better companions than human beings.
59. Many times I find my own standards of conduct at odds with those of other persons.
60. Many people do not make adequate progress in life because they are always comparing themselves with others.
61. In some ways, an acquaintance is better than a friend.
62. Sometimes I find I am too harsh in my criticism of other persons.
63. At a party I like to introduce myself to as many persons as possible.
64. It gives me a feeling of satisfaction to have a powerful personal influence over other people.
65. I am inclined to pay so little attention to what people are saying that I often do not hear them.
66. I rather enjoy a clash of wills in which I make someone do things my way.
67. I avoid doing anything that might be disapproved by the people whom I respect most highly.
68. I never feel really qualified when taking on a new job.
69. Reassurance from my superiors improves my performance on the job.

70. Thorough planning is necessary to insure the successful outcomes of all types of activities.
71. I prefer jobs that are supervisory in nature.
72. I would rather supervise an activity than be a part of the actual activity itself.
73. I feel as though I learn more from those persons who are my superiors socially or intellectually than my peers.
74. I often spend time trying to decide why other people behave as they do.
75. I sometimes accept or reject people as friends on the basis of their social status.
76. I hesitate expressing my opinions or ideas when in a group.
77. Sometimes the desire to better my social status becomes a motivating factor in my work.
78. Being a member of some group or organization is essential for my personal happiness and well being.
79. The most gratifying rewards result from social recognition.
80. Once my ideas get going, I feel I must go on working.
81. Sometimes I drop everything in order to get to work on a new idea of my own.
82. When I feel something deeply I feel impelled to express it.
83. I sometimes change a satisfactory piece of work to try to get a better result.
84. I have a feeling of excitement when an idea I am working on begins to jell.
85. I refuse to compete unless I am sure I can make a good showing.
86. I prefer to be at the head of a project rather than have to work under someone.
87. I rather enjoy persuading people to do things they do not want to do.
88. I enjoy persuading a group to do something my way.
89. I enjoy staying up all night when I'm doing something that interests me.
90. I enjoy doing something on the spur of the moment.
91. I enjoy influencing or controlling the actions of others.
92. I spend a considerable amount of time thinking about the meaning of eternity.
93. I enjoy arguing with an instructor or superior.
94. I prefer fighting for something I want rather than trying to get it by asking.
95. I frequently try things which do not occur to others to try.
96. I like to find ways of converting necessities to advantages.
97. I am willing to risk suffering for the sake of possible growth.
98. I see many problems to work on, much work to do.
99. I sometimes become childishly enthusiastic about an apparently simple thing.
100. I frequently abandon ideas when I see things which may spoil their development.

Appendix 2.

LANGUAGE ARTS ACTIVITIES CHECKLIST

Name of Teacher ______________________________ Date ______________

INSTRUCTIONS: Listed below are a wide variety of activities used in teaching the language arts in the elementary school. It is not likely that any one teacher will use all of these activities in any one year. Please indicate what things you have had your pupils do during the current school year by a single check. In addition, indicate by a double check those activities you have your pupils do since the initiation of the study conducted by the Bureau of Educational Research.

____ 1. "Brainstorming" as a technique for stimulating ideas, developing fluency of ideas, etc.
____ 2. "Props" and "starters" such as a set of general questions to generate ideas or solutions.
____ 3. Some specific set of questions to generate ideas.
____ 4. Practice in playing word games.
____ 5. Pupil invention of new words.
____ 6. Stories from varied arrangements of pictures.
____ 7. Pupil dictation of stories, ideas, etc. on a tape recorder or other electrical recording device.
____ 8. Competition to stimulate fluency of ideas.
____ 9. Stories based on two or more objects, concepts, etc.
____ 10. Regular role playing to stimulate spontaniety and naturalness of expression.
____ 11. "Competitive Team Role Playing" to stimulate fluency of ideas.
____ 12. Introduction to Roget's Thesaurus, some book of synonyms, or other word reference in addition to dictionary.
____ 13. Exercises in recognizing word relationships, words of similar meaning, words of opposite meaning, etc.
____ 14. Having pupils think of new uses for some device or product.
____ 15. Having pupils think of many alternative solutions to a problem.
____ 16. Writing the same message or story in several forms, for different audiences, for different effects, etc.
____ 17. Rewriting story or other composition to have opposite ending.
____ 18. Rewriting story or other composition in a different setting, with different characters, etc.
____ 19. Practice in writing unusual titles or captions for cartoons, pictures, news items, etc.
____ 20. Unusual natural events to stimulate ideas for creative writing.
____ 21. Creation of unusual events or situations to stimulate writing.

____22. Book reports in an original manner.
____23. Writing humorous stories, anecdotes, etc.
____24. Writing limericks, humorous verse, etc.
____25. Study of writings of humorists to study bases of humor.
____26. Film, picture, radio broadcast, TV program, or similar medium to stimulate original writing.
____27. Critical reading of comic books and suggestion of changes.
____28. Reading of stories and poems and suggestion of changes to make them more realistic, accurate, etc.
____29. Specific practice to develop keener observation through senses.
____30. Practice in creative listening, thinking how the speaker really feels about what he says.
____31. Expression of ideas and feelings stimulated by music.
____32. Expression of ideas and feelings stimulated by art experiences.
____33. Practice in drawing conclusions based on facts from several sources.
____34. Writing original plays.
____35. Recording pupils' discussion or other oral work on tape recorder and playing it back.
____36. Having pupils find errors in facts, grammar, etc. in newspapers and similar sources.
____37. Puppet or marionette show.
____38. Illustration of stories or other writings with drawings.
____39. Writing a book or carrying out some other sustained writing project.
____40. Pupils work out their ideas in some concrete, polished product (letter to be mailed, articles to be printed, etc.)
____41. Pupils tell entire stories through pictures, cartoons, photographs, drawings, etc.
____42. Exercises to improve ability to ask good questions.
____43. Exercises to improve ability to make guesses from limited clues.
____44. Reading to stimulate curiosity, questions asking, etc.
____45. Encouragement of "idea-trap" habit for creative writings.
____46. Keeping a folder of their creative writings.
____47. Evolving and testing rules of grammar from readings.
____48. Unusually difficult or even impossible problems to stimulate imagination.
____49. Practice exercises or periods which "don't count" on grades, etc.
____50. "Writer's Corner," a quiet retreat where pupils can go to think and to work out ideas.
____51. Special times occasionally for pupils to think.
____52. Time for self-initiated learning.
____53. Credit for self-initiated learning.

____54. Definite tasks for identifying pupils with special talent in creative writing.
____55. Special encouragement and guidance to pupils gifted in creative writing.
____56. Special tasks for identifying pupils gifted in creative dramatics.
____57. Special encouragement and guidance to pupils gifted in creative dramatics.
____58. Other (specify)
____59. Other (specify)
____60. Other (specify)

Appendix 3.

THINGS DONE ON YOUR OWN CHECKLIST

Name____________________ Grade_____ School______________ Date_______

DIRECTIONS: Below is a list of activities boys and girls sometimes do on their own. Indicate which ones you have done during this school term by checking the blank at the left. Include only the things you have done on your own, not the things you have been assigned or made to do.

( ) 1. Wrote a poem
( ) 2. Wrote a story
( ) 3. Wrote a play
( ) 4. Kept a collection of my writings
( ) 5. Wrote a song or jingle
( ) 6. Produced a puppet show
( ) 7. Kept a diary for at least a month
( ) 8. Played word games with other boys and girls
( ) 9. Used Roget's Thesaurus or some other book in addition to a dictionary
( ) 10. Recorded on a tape recorder and oral reading, dialogue, story, discussion, or the like
( ) 11. Found errors in fact or grammar in newspaper or other printed matter
( ) 12. Acted in a play or skit
( ) 13. Directed or organized a play or skit
( ) 14. Made up and sung a song
( ) 15. Made up a musical composition for some instrument.
( ) 16. Made up a new game and taught it to someone else
( ) 17. Pantomined some story
( ) 18. Acted out a story with others
( ) 19. Wrote letter to a member of family or a friend away from home
( ) 20. Made up an original dance
( ) 21. Played charades
( ) 22. Visited a zoo
( ) 23. Explored a cave
( ) 24. Read a science magazine
( ) 25. Read a science book
( ) 26. Mixed colors
( ) 27. Made a fire cracker
( ) 28. Printed photographs
( ) 29. Grown crystals
( ) 30. Made a leaf collection
( ) 31. Made a wildflower collection

( ) 32. Made an electric motor
( ) 33. Made a musical instrument
( ) 34. Planned an experiment
( ) 35. Dissected an animal
( ) 36. Grafted a plant or rooted one from a cutting
( ) 37. Distilled water
( ) 38. Used a magnifying glass
( ) 39. Made ink
( ) 40. Made leaf prints
( ) 41. Started a fire with a lens
( ) 42. Used a magnet
( ) 43. Raised rats, mice, rabbits, or guinea pigs
( ) 44. Collected insects
( ) 45. Collected rocks
( ) 46. Kept a daily record of weather
( ) 47. Been a bird watcher
( ) 48. Kept a science notebook
( ) 49. Kept a science scrapbook
( ) 50. Attended a science fair or display
( ) 51. Used a chemistry set
( ) 52. Produced static electricity
( ) 53. Constructed a model airplane
( ) 54. Designed a model airplane
( ) 55. Counted annual rings in a log
( ) 56. Made a stamp collection
( ) 57. Made a collection of post marks
( ) 58. Organized or helped to organize a club
( ) 59. Served as officer in a club organized by boys and/or girls
( ) 60. Figured out a way of improving a game we play at school or home
( ) 61. Figured out a way of improving the way we do something at home
( ) 62. Figured out a way of improving the way we do something at school
( ) 63. Figured out a way of improving the way we do something in a club, Scouts, or the like
( ) 64. Solved a problem about getting along with my parents
( ) 65. Solved a problem about getting along with other boys and girls
( ) 66. Helped act out some historical event
( ) 67. Found out about the history of my city or community
( ) 68. Found out about the way some government agency (post office, court, etc.) operates
( ) 69. Wrote a letter to children in another country
( ) 70. Wrote a letter to children in another state
( ) 71. Made a map of my community
( ) 72. Made my own decision about the use of money
( ) 73. Asked questions about the way some business operates

IV. Describe the general activity level of the exploratory period.

____

____

V. What kind of roles developed for WHITE?

____

____

____

____

VI. How did the group go about planning the demonstration?

____

____

____

____

VII. What role or roles did WHITE play in this planning?

____

____

____

VIII. What role was WHITE assigned in the demonstration?

____

____

____

____

IX. Additional comments and observations about the behavior of the group:

Appendix 5.

REACTION SHEET AT END OF SCIENCE-TOY TASK

Your Color________________________Group No.___________________Grade______

1. Rank from "most valuable" to "least valuable" the contributions of each member of this group to its success. In the first blank, write the color (white, red, etc.) of the one who did most to help the group succeed and so on to the one who did the least to help the group. Please include yourself.

1.______________________
2.______________________
3.______________________
4.______________________
5.______________________

2. How much did you enjoy your activity during the past hour? Check the one which describes your feeling.

_____Very much. More fun than anything else we've done today.
_____Quite well. I would like to do something similar to this again.
_____All right. I wouldn't mind doing something like this again.
_____Not too bad. I wouldn't care to do anything like this again.
_____Not at all. I disliked it very much.

3. How well do you think your group did in comparison to the other groups in your class?

_____first (best)
_____second
_____third
_____fourth
_____fifth (lowest)

Appendix 6.

EVALUATION OF READING SET FORM

Name: ____________________ Date: ___________ Set Assigned: A___ B___ C___

1. Did you read the assignment for today? (Check one.)

_____ Yes
_____ No

2. Did you try to maintain the "reading set" assigned?

_____ Yes
_____ No

3. How completely did you maintain this "set" in reading today's assignment?

_____ Not at all
_____ Less than 25 per cent of the time
_____ About a third of the time
_____ About half the time
_____ About two-thirds of the time
_____ About 75 per cent of the time
_____ Almost all of the time

4. How difficult did you find learning to use the set assigned?

_____ Impossible
_____ Extremely difficult
_____ Very difficult
_____ Fairly difficult
_____ Fairly easy
_____ Extremely easy

5. Approximately how many minutes did you devote to today's reading assignment? ______________________________

6. Rate your experience in maintaining the "reading set" assigned by using the semantic scales below. If the word at the left describes accurately your feelings about this experience, place your check-mark (X) near this word. If your feelings about this experience are the reverse, place your check-mark near the word at the right. If your feelings are in-between, place them at some appropriate place between the poles.

a. good _____ : _____ : _____ : _____ : _____ : _____ : _____ : bad
b. pleasureable _____ : _____ : _____ : _____ : _____ : _____ : _____ : painful
c. labored _____ : _____ : _____ : _____ : _____ : _____ : _____ : easy
d. wise _____ : _____ : _____ : _____ : _____ : _____ : _____ : foolish
e. active _____ : _____ : _____ : _____ : _____ : _____ : _____ : passive
f. fast _____ : _____ : _____ : _____ : _____ : _____ : _____ : slow
g. cautious _____ : _____ : _____ : _____ : _____ : _____ : _____ : rash
h. new _____ : _____ : _____ : _____ : _____ : _____ : _____ : old
i. interesting _____ : _____ : _____ : _____ : _____ : _____ : _____ : boring

Appendix 7

SEMANTIC EVALUATION OF READING EXPERIENCE

Name:____ Date:____________

INSTRUCTIONS: The purpose of your completing this set of ratings is to measure the meaning of your experience in reading one research article critically and another creatively. You are requested to judge these two experiences against a series of descriptive scales. Use one page to describe your experience in reading and reporting critically and the other to rate your experience in reading and reporting creatively.

Here is how you are to use these scales: If you feel that the word at the left describes accurately how you experienced the activity, you should place your check-mark near the word as in the following example. If you experienced it in an opposite way, place your check near the word at the right. If you experienced it as somewhere between the two poles, place your check-mark at an appropriate place on the scale.

Ex.: Fair __X__: ____: ____: ____: ____: ____: ____: unfair

Experience rated: Critical reading/reporting____ creative reading/reporting____

1. safe ____: ____: ____: ____: ____: ____: ____: dangerous
2. enjoyable ____: ____: ____: ____: ____: ____: ____: painful
3. clean ____: ____: ____: ____: ____: ____: ____: dirty
4. successful ____: ____: ____: ____: ____: ____: ____: unsuccessful
5. meaningful ____: ____: ____: ____: ____: ____: ____: meaningless
6. important ____: ____: ____: ____: ____: ____: ____: unimportant
7. wise ____: ____: ____: ____: ____: ____: ____: foolish
8. hard ____: ____: ____: ____: ____: ____: ____: soft
9. complex ____: ____: ____: ____: ____: ____: ____: simple
10. sober ____: ____: ____: ____: ____: ____: ____: drunk
11. rational ____: ____: ____: ____: ____: ____: ____: intuitive
12. sane ____: ____: ____: ____: ____: ____: ____: insane
13. cautious ____: ____: ____: ____: ____: ____: ____: rash
14. interesting ____: ____: ____: ____: ____: ____: ____: boring
15. savory ____: ____: ____: ____: ____: ____: ____: tasteless
16. masculine ____: ____: ____: ____: ____: ____: ____: feminine